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**O'BRIEN & GERE**

013



Certified Mail - RRR

18 April 1989

Director, Waste Management Division  
USEPA, Region V  
Attn: Mr. Brad Bradley (5HE-12)  
230 S. Dearborn Street  
Chicago, Illinois 60604

Director, Illinois Environmental  
Protection Agency  
Attn: Mr. Ken M. Miller  
2200 Churchill Road  
Springfield, Illinois 62706

Re: NL/Taracorp Site  
Granite City, Illinois

File: 2844.012

Gentlemen:

In accordance with Mr. Stephen Holt's request, enclosed is the Alternative Development Report for the Taracorp Site in Granite City. The Report is submitted in accordance with the requirements of subparagraph 14(b)(4) of the RI/FS Administrative Order by Consent. The Report addresses comments made at our meeting in Chicago on February 8.

Mr. Holt is expected to contact you this week to discuss the Screening of Alternatives meeting.

Very Truly Yours,

**O'BRIEN & GERE ENGINEERS, INC.**

Frank D. Hale, P.E.  
Managing Engineer

FDH:bh  
Enclosure

cc: D.M. Crawford  
S.W. Holt  
Deputy Chief, Environmental  
Control Division  
Illinois Attorney General's Office  
500 South Second Street  
Springfield, Illinois 62706

# Final Report

## **Alternatives Development Taracorp Site**

**Granite City, Illinois**

**April 1989**



**O'BRIEN & GERE**

2844.012

REPORT

ALTERNATIVES DEVELOPMENT  
TARACORP SITE  
GRANITE CITY, ILLINOIS

APRIL 1989

PREPARED BY:

O'BRIEN & GERE ENGINEERS, INC.  
440 VIKING DRIVE  
VIRGINIA BEACH, VIRGINIA 23452

## TABLE OF CONTENTS

	<u>PAGE</u>
SECTION 1 INTRODUCTION	
1.1 Objectives and Overview	1
1.2 Site Background Information	2
1.2.1 Site Description	2
1.2.2 Site History	3
1.3 Nature and Extent of Contamination	4
1.3.1 Contaminants Detected	4
1.3.2 Taracorp Pile	5
1.3.3 Area 1 Battery Case Material and Soils	5
1.3.4 Surface Soils	6
1.3.5 Eagle Park Acres	7
1.3.6 Venice Township Alley	7
1.3.7 Ground Water	8
1.4 Contaminant Fate and Transport	9
1.4.1 Air Pathway	9
1.4.2 Soil and Direct Contact Pathway	10
1.4.3 Surface Water Pathway	11
1.4.4 Ground Water Pathway	11
1.4.5 Summary	11
1.5 Baseline Risk Assessment	11
1.6 Applicable or Relevant and Appropriate Requirements	13
1.6.1 Chemical Specific ARARs	14
1.6.2 Action Specific ARARs	17
1.6.3 Location Specific ARARs	19
1.7 Remedial Response Objectives	19
SECTION 2 IDENTIFICATION AND SCREENING OF REMEDIAL TECHNOLOGIES	
2.1 Screening Criteria and Methodology	23
2.2 Identification of General Response Actions	24
2.2.1 No Action	24
2.2.2 Institutional Actions	24
2.2.3 Containment Actions	25
2.2.4 Removal Actions	25
2.2.5 Treatment Actions	25

TABLE OF CONTENTS  
(continued)

	<u>PAGE</u>
2.3 Identification and Screening of Technologies	25
2.3.1 No Action	25
2.3.2 Institutional Actions	26
2.3.3 Containment Actions	27
2.3.4 Removal Actions	29
2.3.5 Treatment Actions	30
2.4 Summary of Remedial Technology Screening	34
SECTION 3 DEVELOPMENT OF THE PRELIMINARY ALTERNATIVES	
3.1 Development of Preliminary Remedial Alternatives	35
3.1.1 Alternative A	35
3.1.2 Alternative B	37
3.1.3 Alternative C	39
3.1.4 Alternative D	41
3.1.5 Alternative E	43
3.2 Screening of Alternatives	45

TABLES

1. Ground Water Data Summary - Shallow Wells
2. Ground Water Data Summary - Deep Wells
3. Ambient Air Lead Monitoring Data
4. Applicable or Relevant and Appropriate Requirements
5. Ground Water Quality Standards
6. Preliminary Remedial Action Objectives, Technology Types  
    and Process Options
7. Estimated Surface Areas, Volumes and Masses
8. Initial Screening of Technologies and Process Options  
    For Soils/Alleys
9. Initial Screening of Technologies and Process Options  
    For Waste Piles
10. Evaluation of Process Options - Soils/Alleys
11. Evaluation of Process Options - Waste Piles
12. Preliminary Remedial Alternatives

TABLE OF CONTENTS  
(continued)

PAGE

FIGURES

1. Location Map
2. Land Use Map
3. Taracorp Pile
4. Aerial Photograph with Soil Analyses
5. Eagle Park Acres
6. Venice
7. Well Location Map
8. Air Monitoring Locations
9. Taracorp Pile Containment

## SECTION 1 - INTRODUCTION

### 1.1 Objectives and Overview

A Remedial Investigation (RI) Report was completed for the Taracorp Site (Site) in Granite City, Illinois. The RI Report was approved by the USEPA and Illinois EPA on February 6, 1989. This Report presents the initial steps involved in selecting a remedial plan for the facility. To accelerate the project, this Alternatives Development Report represents the first two chapters and a portion of the third chapter of the Feasibility Study Report to be submitted later this year. Subsequent submissions; Alternative Screening, and Alternative Evaluation will involve the preparation of additional chapters of the Feasibility Study Report. Comments on each submittal will be addressed in subsequent submissions so as to minimize response times at the end of the Feasibility Study.

This Report is divided into three sections, tables, figures, appendices, and exhibits. A brief overview of these sections follows.

Section 1 presents information on the site, its history, and environmental conditions at the site and its environs. This section is intended to summarize the information contained in the approved RI Report. In addition it presents a discussion of contaminant fate and transport as well as a summary of the baseline risk assessment.

Section 2 presents the identification and screening of remedial technologies. Included within this section is the presentation of remedial action objectives as well as a description of technologies which address the remedial action objectives.

Section 3 presents the development of the preliminary remedial options. This section combines technologies addressing different media into remedial alternatives which address all of the remedial objectives. For this report this section is limited to the development of remedial options. The next submittal will include the screening of the remedial alternatives presented here.

Tables have been prepared to summarize data generated as part of this study.

Figures prepared to help summarize and present key issues are included in the Report.

Appendices include raw data, calculations, or other materials prepared by O'Brien & Gere which support the interpretations presented in the Report.

Exhibits include tables, reports, or other information prepared by an organization other than O'Brien & Gere which would assist a reviewer in understanding the Report.

## 1.2 Site Background Information

### 1.2.1 Site Description

The Site is located within the Mississippi River Valley; however, it is not within the 100 year flood plain of any surface water. Figure 1 illustrates the location of the site within Granite City. The Site is located within a heavily industrialized section

of Granite City, Illinois, a community of approximately 40,000 people across the Mississippi River from St. Louis, Missouri. Figure 2 presents a zoning map for the area surrounding the Site.

#### 1.2.2 Site History

The Taracorp Site is the location of a former secondary lead smelting facility. Metal refining, fabricating, and associated activities have been conducted at the Site since before the turn of the century. Prior to 1903, the facilities at the Site included a shot tower, machine shop, factory for the manufacture of blackbird targets, sealing wax, manufacture of mixed metals, refining of drosses, and the rolling of sheet lead. From 1903 to 1983 the facilities included secondary lead smelting capability. Secondary smelting activities included a blast furnace, a rotary furnace, several lead melting kettles, a battery breaking operation, a natural gas fired boiler, several baghouses, cyclones and an afterburner. Secondary lead smelting operations were discontinued during 1983 and equipment dismantled.

In June of 1981 St Louis Lead Recyclers, Inc. (SLLR) began using equipment on adjacent property owned by Trust 454 to separate components of the Taracorp waste pile. The objective was to recycle lead bearing materials to the furnaces at Taracorp and send hard rubber and plastic off site for recycle. SLLR continued operations until June 1983 when it shut down its equipment. Residuals from the operation remain on Trust 454 property as does some equipment.

A State Implementation Plan - Granite City was published in September 1983 by the IEPA. The IEPA's Report indicated that the lead nonattainment problem was in large part attributable to emissions associated with operation of the secondary lead smelter and lead reclamation activities conducted by SLLR. The IEPA procured Administrative Orders by Consent with Taracorp, St Louis Lead Recyclers Inc, Stackorp Inc, Tri-City Truck Plaza, Inc. and Trust 454 during March 1984. The orders specified the implementation of remedial activities relative to the air quality.

Due to Taracorp's Chapter 11 bankruptcy and NL's former ownership of the Site, NL voluntarily entered into an Agreement and Administrative Order by Consent with the USEPA and IEPA in May 1985 to implement a Remedial Investigation and Feasibility Study (RI/FS) of the Site and other potentially affected areas. The USEPA determined that the Site was a CERCLA facility and it was placed on the National Priorities List on June 10, 1986.

### 1.3 Nature and Extent of Contamination

#### 1.3.1 Contaminants Detected

The RI Report presented considerable information on site conditions and substances present. This subsection is intended to summarize that document to establish basic information necessary to evaluate remedial options.

In selected locations substances detected at above background concentrations during the RI fit into two basic categories: heavy metals and anions. With the exception of the ground water analyses, lead was consistently at higher concentrations than these

other metals. Lead in the ground water was either not detectable or at concentrations below the MCL; however, cadmium and arsenic were detected at concentrations above the MCL in the shallow ground water. The anions identified in the ground water were primarily sulfates and carbonates.

#### 1.3.2 Taracorp Pile

Located on the site is a pile composed primarily of blast furnace slag and battery case material. Figure 3 is a topographic survey of the Taracorp Pile and adjacent case material piles. The volume of the pile is approximately 85,000 cubic yards. In addition, smaller piles immediately adjacent to the Taracorp pile, which were associated with the adjacent SLLR recycling operation, comprise approximately 2450 cubic yards. Tests conducted on the materials in the piles demonstrate lead concentrations in the range of 1-28% for the Taracorp pile. EP toxicity test results demonstrate that the waste pile materials are a characteristic hazardous waste under 40 CFR 261. In addition, on the surface of the pile are 25-35 containers holding solid wastes from the smelting operations which normally are recycled back to the smelting operation. These containers remained after the smelting operations ceased in 1983.

#### 1.3.3 Area 1 Battery Case Material and Soils

Area 1 consists of property owned by Trust 454 and Tri City Trucking. These properties abut the Taracorp Site and were the subject of previous regulatory action.

Trust 454 property contains a pile of battery case material as well as unpaved areas. The SLLR pile contains approximately 3920 cubic yards in two general areas. The lead concentration range in this pile was 10-30% mg/kg. EP toxicity analyses of the pile materials indicate that this material has characteristics similar to those of the Taracorp pile and should be managed as hazardous waste. Analyses of the unpaved area indicate a lead concentration at the surface of 9250 mg/kg. All lead concentrations in solid matrices are reported on a dry weight basis. The paving of this area was the subject of a Consent Order signed by SLLR, Trust 454, and Stackorp during 1984.

Tri City Trucking property includes a large unpaved area which is used to park and service trucks. Analyses of soils from areas around this property suggest that the soils contain lead concentrations on the order of 4000 mg/kg. A Consent Order signed by Tri City Trucking in 1984 required the paving of this unpaved area.

#### 1.3.4 Surface Soils

Surface soil samples were collected from 50 locations not including Taracorp or Trust 454 properties. Figure 4 presents the soil sample locations and the results of surface soil analyses. Generally samples were collected at depths of 0-3 and 3-6 inches below grade. With the exception of one anomalous value, approximately 3200 feet from the site boundary, the results indicate that the lead concentration in surface soils (0-3) within 1/4 mile of the site boundary were higher (514-4150 mg/kg) than

those further from the site (200-500 mg/kg). Samples collected from the surface (0-3 inches) generally contained more lead (average 1160 mg/kg) than the deeper (3-6 inch) samples which averaged 560 mg/kg.

EP Toxicity testing of a soil sample with a total lead concentration of 3110 mg/kg demonstrated that the lead in the soil sample tested was not extractable, therefore, this material is not a characteristic hazardous waste under 40 CFR 261.

#### 1.3.5 Eagle Park Acres

Eagle Park Acres includes some vacant land where battery case material was hauled. Figure 5 presents the soil sample locations and analytical results. The battery case material was used to fill a ditch on the property and a portion has been uncovered during subsequent excavation. The approximate volume of material and surrounding soil at Eagle Park is 2700 cubic yards. Testing of the soil in this area indicated surface lead concentrations ranging from 63 mg/kg to 3280 mg/kg.

#### 1.3.6 Venice Township Alleys

According to residents in the area, Venice Township hauled hard rubber case material to unpaved alley's in Venice Township. Figure 6 presents the sample locations and soil lead results for this area. Tests conducted on these alleys resulted in a wide range of lead concentrations. Surface lead concentrations ranged from 200 mg/kg to 126,000 mg/kg. The estimated volume of battery case material and associated soil in these alleys is 670 cubic yards.

#### 1.3.7 Ground Water

The Site is underlain to a depth of approximately 100 feet by alluvial, glaciofluvial, and glaciolacustrine deposits. These deposits become progressively coarser with depth. Recharge to ground water within the area is from precipitation and infiltration from surface water. The area receives approximately 35 inches of precipitation annually with an average pH of wet deposition of approximately 4.4 Standard Units (S.U.) Water within the unconsolidated deposits beneath Granite City is used for industrial and flood control purposes. No potable uses for the ground water between the site and the Chain of Rocks Canal were identified after a thorough review of Illinois State Water Survey records. The area surrounding the site has city water obtained from the Mississippi River.

Twelve monitoring wells were installed as part of a ground water investigation which began in October 1982. Figure 7 illustrates the location of these wells relative to the site. The ground water flows in a south-south westerly direction towards the Mississippi River at a velocity ranging from 0.002 feet/day to 0.5 feet/day.

Ground water quality since 1982 has remained reasonably consistent. Lead concentrations observed in all wells have generally remained less than 0.02 mg/l, within the drinking water standards for lead of 0.05 mg/l. Background ground water quality in the shallow wells is characterized by dissolved solids ranging from 625 mg/l to 1000 mg/l, sulfates ranging from 165 mg/l to 320

mg/l, and a pH of 6.6. Background ground water quality in the deeper wells is characterized by dissolved solids of 993 mg/l, and alkalinity of 430 mg/l as CaCO<sub>3</sub>, sulfate of 288 mg/l, and a pH of 6.7 S.U. In addition, the filterable manganese concentration was 0.99 mg/l. Accordingly, the ground water is not suitable for development as a potable supply due to concentrations of dissolved solids, sulfates, and manganese above values presented in 40 CFR 143 (dissolved solids (500), sulfate (250), manganese (0.05)).

Tables 1 and 2 present the results of ground water quality analyses conducted as part of the Remedial Investigation. A shallow and adjacent deep well located on the site demonstrated elevated concentrations (as compared to background) of sulfates, dissolved solids, arsenic, cadmium, manganese, nickel, and zinc. However, data from shallow wells located at the hydraulically down gradient property boundary demonstrated water quality similar to that in the background monitoring well. This suggests that heavy metals are not migrating off the site in this zone. This is explained by the high alkalinity of the ground water, the low solubility of metal carbonates, and cation exchange within the unconsolidated deposits.

#### 1.4 Contaminant Fate and Transport

##### 1.4.1 Air Pathway

A variety of activities have contributed to the lead residues monitored in the Granite City study area. Combustion of coal, fuel oil, and leaded gasoline all contribute lead to the urban environment. In addition, the various lead smelting activities

carried out on the Taracorp site have contributed lead to the study area. These combined sources resulted in ambient air concentrations in excess of the Ambient Air Quality Standard of 1.5 ug/m<sup>3</sup> prior to 1983. The blast furnace was shut down in 1983. Table 3 presents air quality data for the period 1978 through 1986. More recent data is similar to that obtained for 1986.

In addition to the above referenced sources of lead, two site related sources remain in the study area which provide for a potentially functional air exposure pathway; the exposed lead bearing wastes at the Taracorp facility and exposed soils of surrounding areas which received fallout in the form of particulate lead from emissions of lead smelting operations. These particulate lead residues may become airborne as the result of wind, traffic and movement of heavy machinery, and recreational activities in exposed soil areas.

Off-site airborne transport of lead residues from the Taracorp facility in the form of windborne particles, with subsequent off-site direct contact exposure to deposited particles, is currently minimal since the facility ceased smelting operations. This conclusion is supported by air monitoring in the study area, which during 1987 averaged 0.26 ug/m<sup>3</sup> of lead, 17% of the national ambient air stand for lead.

#### 1.4.2 Soil and Direct Contact Pathway

Operation of the smelting facility for over eighty years has resulted in elevated surface and subsurface soil residues which represent a functional pathway for exposure via direct contact and

subsequent ingestion of lead-contaminated soils. Another mechanism which occurred is the transport of case material to off site areas.

#### 1.4.3 Surface Water Pathway

The surface water pathway was determined to be non-functional based on the absence of surface waters in the study area. Observed runoff away from the area of the Taracorp pile is limited to the property of Tri City Trucking, Trust 454, and Taracorp.

#### 1.4.4 Ground Water Pathway

Transport of contaminants by ground water was determined to be incomplete based on the absence of ground water wells known to be used as drinking water sources. In addition, recharge of site-related ground water to surface water other than to the Chain of Rocks Canal is not probable.

#### 1.4.5 Summary

The results of the evaluation of contaminant transport and fate in the study area indicate two scenarios for potential human exposure to lead in addition to conventional site related urban lead sources. These pathways are 1) the airborne route, with lead bearing soil particulates and dusts transported from friable soils on the Taracorp site to off-site locations for subsequent inhalation; 2) the direct contact route, with exposed soils previously contaminated with lead from particulate fallout providing a source for ingestion of lead residues.

#### 1.5 Baseline Risk Assessment

The RI presented a detailed site specific risk assessment which addressed on site and off site conditions and exposures. The

RI Report determined that because of soil lead concentrations, human exposures via inadvertent soil ingestion and, to a lesser extent, by inhalation of dusts was possible.

The quantitative risk assessment of the complete exposure scenarios at the Granite City study area was conducted using a three pronged approach. First, available monitoring data for blood lead content of area residents was compared with values considered by health agencies to constitute a level of concern. Secondly, a hypothetical worst case scenario was analyzed, which assumed chronic lifetime contact with exposed soils. Finally, an available published study was utilized which provided a basis for estimating incremental increases in blood lead due to exposure to increasing levels of soil lead. The results of all three approaches indicate that the soil lead and air residues present in the Granite City study area do not represent an unacceptable risk to public health. Higher exposed surface lead residues exist in areas of Venice Township which, under chronic exposure conditions, could impact human health. However, a survey of blood lead content in residents of this area did not produce evidence of such a health impact, suggesting that significant exposure to these residents is not occurring.

The approval of the RI Report by the U.S.EPA included necessary changes to the RI Report. Since the U.S. EPA withdrew the reference dose for lead prior to submission of the RI Report, they were unable to endorse the risk assessment presented in the RI Report. In the RI Report approval letter, the U.S.EPA uses a

recommendation derived from a 1977 air quality criteria document for lead which states "In general, lead in soil and dust appears to be responsible for blood lead levels in children increasing above background levels when the concentration in soil or dust exceeds 500-1000 ppm". This recommendation was adopted by the Center For Disease Control (CDC) in their 1985 document Preventing Lead Poisoning in Young Children.

In summary, the impact of lead on public health is under considerable investigation at this time. The U.S.EPA is considering establishing a task force to evaluate risks associated with exposure to lead in surface soils. The results of the site specific risk assessment and consideration of U.S.EPA's comments on that risk assessment, suggest that under worst case conditions some increase in blood lead concentration could be expected in selected areas around the site. The impact of that increase is the subject of considerable debate within the toxicological community.

#### 1.6 Applicable or Relevant and Appropriate Requirements

Applicable or Relevant and Appropriate Requirements (ARARs) establish a framework for the selection of a remedial alternative at the Taracorp site. Draft Guidance on the selection and use of ARARs is provided in an August 1988 publication titled CERCLA Compliance with Other Laws Manual. ARARs are site specific, therefore, the purpose of this section is to identify ARARs and other information to be considered (TBCs) during the evaluation of remedial alternatives at the Taracorp Site.

ARARs are conveniently separated into three general types: chemical specific, action specific, and location specific.

Chemical specific requirements "... are usually health or risk based numerical values or methodologies which, when applied to site specific conditions, result in the establishment of numerical values. These values establish the acceptable amount or concentration of a chemical that may be found in, or discharged to the ambient environment." (USEPA, 1988)

Action specific requirements "... are usually technology or activity based requirements or limitation on actions taken with respect to hazardous wastes. (USEPA, 1988)

Location specific requirements "...are restrictions placed on the concentration of hazardous substances or the conduct of activities solely because they occur in special locations", (USEPA, 1988).

This section is organized to address these general categories of ARARs. In accordance with a February 1 letter from USEPA to NL Industries addressing potential ARARs, the state regulations are cited with federal regulations cited only when state regulations are not available or there is a substantial difference between the two programs.

#### 1.6.1 Chemical Specific Requirements

Chemical specific requirements are presented for each medium of interest at this site.

## Air

Table 4 presents air related ARARs. The applicable numerical criteria for lead in ambient air is defined as  $1.5 \text{ ug/m}^3$ . In addition, construction activities must meet regulations for worker exposure to lead in air incorporated in 29 CFR.

## Taracorp Pile and Other Wastes

Chemical specific ARARs for solid wastes independent of selected actions at the site have not been identified.

## Soils

Chemical specific ARARs for soils independent of selected actions at the site have not been identified.

## Surface Water

The absence of surface water near the site and demonstrated ground water quality indicates that surface water related ARARs are not applicable. Should a remedial technology result in the collection of runoff from the pile or leachate for discharge to the Granite City sewer system then existing sewer use ordinances would be considered as Action Specific ARARs.

## Ground Water

Under the Ground Water Protection Strategy, EPA has defined three aquifer classes:

Class 1, Special Ground Water which includes those aquifers highly vulnerable to contamination and either irreplaceable sources of drinking water or ecologically vital.

Class 2, Current and Potential Sources of Drinking Water Having Other Beneficial Uses, includes all other ground water currently used or potentially available for drinking water or other beneficial uses.

Class 3, Ground Water Not Considered a Potential Source of Drinking Water and of Limited Beneficial Use, includes saline or otherwise contaminated ground water beyond the level of cleanup currently employed in public water system treatment. The ground water must not migrate to Classes 1 or 2 or discharge to surface water and cause further degradation.

Based on information provided by the Illinois State Water Survey, ground water is not currently being used as a drinking water source in Granite City. As presented in Section 1.3.7, municipal water derived from the Mississippi River is provided to the area hydraulically down gradient of the Taracorp Site. Existing wells in the area have been identified as supplying water for flood control and lawn care; not potable uses.

Hydraulically upgradient wells contain total dissolved solids, manganese and sulfates at concentrations above Public and Food Processing Water Supply Standards contained in the State of Illinois Pollution Control Rules and Regulations (PCBRR) Title 35:Subtitle C, Chapter 1, Part 302, Subpart C. Technology for the removal of dissolved solids and sulfates is not currently employed in the Granite City public water system treatment, therefore, the aquifer beneath the site would be identified as a Class 3. Illinois PCBRR provides a water quality standard for waters of the

state for which there is no specific designation under Subtitle C, Chapter 1, Part 302, Subpart B. These general use standards are considered applicable for ground water beneath the site and are presented as Table 5.

1.6.2 Action Specific ARARs

Landfill On Site

→ fug. dust regs, OSHA during excavation

Testing conducted as part of the RI indicated that materials within the pile are classified as characteristic hazardous wastes because of the extractable metal content. The Illinois regulations concerning management of hazardous waste are contained in Title 35, Subtitle G Part 724. Subpart L addresses Waste Piles their management and closure. One option for closure under 35 IAC 724.358 is to close the facility with waste left in place. Final cover requirements which are considered relevant and appropriate follow:

1. Provide long-term minimization of migration of liquids through the closed landfill;
2. Function with minimum maintenance;
3. Promote drainage and minimize erosion or abrasion of the cover;
4. Accommodate settling and subsidence so that the cover's integrity is maintained; and
5. Have a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present.

After closure, the following relevant and appropriate requirements are imposed under 35 IAC 724.410(b):

1. Maintain the integrity and effectiveness of the final cover, including making repairs to the cap as necessary to correct the effects of settling, subsidence, erosion or other events;
2. Continue to operate the leachate collection and removal system until leachate is no longer detected;
3. Maintain and monitor the groundwater monitoring system and comply with all other applicable requirements of Subpart F;
4. prevent run-on and run-off from eroding or otherwise damaging the final cover; and
5. Protect and maintain surveyed benchmarks used in complying with Section 724.409.

#### Landfill Off Site

Transport of materials from the Taracorp Piles or SLLR Piles would involve compliance with hazardous waste management regulations. 35 IAC Subtitle G, Subpart C, Generators, would be considered the applicable regulation. Transport of off-site soils removed as part of the excavation process are not characteristic or listed wastes, therefore, the applicable regulation would be under 35 IAC 807. Other ARARs which may apply depending on excavation method are listed in Table 4.

#### Taracorp Pile Treatment On Site

Treatment of the pile contents on-site would involve compliance with technical criteria included in 35 IAC Subtitle G. Such treatment would involve waste segregation and off-site transport. Activities would have to be conducted in a manner which allows meeting chemical specific ARARs included in Table 4.

### Taracorp Pile Treatment Off Site

Treatment of pile contents off-site could require transport of all or portions of the pile off-site. The applicable regulation would include generator requirements under 35 IAC Subtitle G, Part 700, Subpart C.

#### 1.6.3 Location Specific ARARs

##### Flood Plain Regulations

Although the Taracorp Site is not in the Mississippi River Flood Plain sensitive surrounding areas are. Because no structures are planned for the surrounding areas, flood plain regulations are not considered ARARs.

##### Wet Land Regulations

The Taracorp Site and the other areas considered for remediation are not adjacent to surface waters and not included as wetlands. Therefore, wet land regulations are not considered ARARs.

#### 1.7 Remedial Response Objectives

The Remedial Response Objectives for the Granite City site are presented in Table 6 for each complete exposure pathway posing a risk to public health and the environment. The following text presents the logic used to develop those objectives.

##### Soil

A surface soil lead concentration was identified in the Risk Assessment as being protective of human health within residential areas. For these areas a surface soil concentration protective of human health under upperbound worst case assumptions was calculated

at a concentration below 1500 mg/kg of lead in soil. As discussed in Section 1.5 CDC reported that a soil lead concentration in residential areas in the range of 500 to 1000 mg/kg should not, increase blood lead concentrations above background. Based on these considerations the remedial response areas presented in Figure 4 were identified.

Present usage of commercial zoned areas is inconsistent with worst case assumptions included in the Risk Assessment. However, portions of these areas could be regularly frequented; therefore, the same criteria will be applied to soils in these areas. Heavy industrial zoned areas are not subject to the same usage; therefore, the response objective for these areas is to be protective of human health under reasonable exposure conditions or a concentration of less than 4800 mg/kg.

The areas around the site have been separated to simplify the discussion of remedial alternatives for soils. Figure 4 presents the five areas being considered during the development of alternatives. The areas include the Taracorp Site and an eighteen block area located to the east and south of the site. These areas were selected based on land use, see Figure 2, measured lead concentrations in the vicinity, and anticipated transport patterns from the lead smelting operations, and clearly defined boundaries.

As illustrated in Figure 4 and presented in the RI Report there are selected properties within the City which had elevated lead concentrations but have not been included in the areas considered for remediation. These sample locations often included

areas near roadways and driveways; were thus subject to contamination from leaded gasoline. In addition, these areas were not considered to be representative of the worst case risk assessment presented in the RI Report because the contamination is localized and not in areas where gardens or youth activities are anticipated.

#### Waste Piles

The waste piles consist of various process wastes resulting from secondary lead smelting operations including slag, dross, matte, grid metal, and plastic and rubber battery cases. The risk assessment based response objectives for the surface concentration of the waste pile located in a limited access area is the same as for heavy industrial zoned properties.

ARARs to be considered in the development of remedial alternatives for the waste piles are presented in Table 6. The major components within the waste pile are blast furnace slag/matte and battery case material which have been determined to have hazardous characteristics pursuant to 40 CFR 261. Consequently, ARARs for this material are those associated with the management of hazardous wastes.

#### Ground Water

The response objective for ground water is based on Illinois ground water standards; however, these objectives may be modified to reflect ground water quality entering the site. Table 5 presents the applicable standards for water at the property boundary. The "background" water quality did demonstrate total

dissolved solids and manganese at concentrations equal to the Illinois ground water quality standards. The response objective is to limit migration of site related substances to ground water to rates sufficient to allow ground water quality at the property boundary to meet Illinois standards or match "background" quality if it exceeds the published standards.

#### Air

The response objective is to maintain air quality at 1.5 ug of Pb/m<sup>3</sup> in ambient air as has been the case at air monitoring stations for the past six years.

## SECTION 2 - IDENTIFICATION AND SCREENING OF REMEDIAL TECHNOLOGIES

### 2.1 Screening Criteria and Methodology

The identification and screening of remedial technologies was accomplished using a multi-phased approach based on that presented in the U.S. EPA's Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA (Interim Final, August 1988). The approach used was consistent with the Consent Order and the NCP. This section describes and documents the identification and screening of technologies used for the Taracorp site.

Once the remedial action objectives and ARARs are identified (Sections 1.6 and 1.7) general response actions for each medium of interest are defined such that the remedial action objectives would be satisfied. The volumes or areas of contaminated media are then identified, based on the site conditions defined by the RI, and the level of protectiveness specified and screened on the basis of technical implementability. Technology types and process options which cannot be effectively implemented would not be considered further. The remaining process options are then screened in greater detail with respect to the data gathered during the RI based on the following criteria:

1. **Effectiveness.** This criterion evaluates the technology process options in terms of handling the estimated areas or volumes of contaminated media and meeting the pertinent remedial action objectives. It also considers the effectiveness in protecting human health and the environment during construction and implementation. The criterion also considers how proven and reliable the process option would be relative to site conditions.

2. Implementability. The feasibility of implementing a process option under such institutional constraints as the availability of treatment, storage, and disposal services, special permitting requirements, and the need and availability of equipment and skilled workers is evaluated by this criterion.
3. Cost. A cost analysis limited to relative capital and operation and maintenance costs is conducted.

## 2.2 Identification of General Response Actions

The remedial response objectives for the Taracorp site are presented in Section 1.7 and Table 4. General response actions pertinent to the Taracorp site will be based on these objectives. The list of general response actions presented in Table 8 and other typical means for addressing the objectives were evaluated relative to the actions. The general response actions which were determined to be applicable to the objectives were no action, institutional actions, containment actions, removal actions, and treatment actions.

### 2.2.1 No Action

This general response action does not contain technologies but rather can be used to identify contamination problems in the absence of remediation. No Action is typically carried through the FS as an alternative which is used as a basis for comparing the other alternatives.

### 2.2.2 Institutional Actions

Institutional Actions include legal, local or state restrictions which can be enacted and enforced to protect public

health and the environment in the vicinity of the site before, during, and/or after implementation of the remedial action.

#### 2.2.3 Containment Actions

Containment Actions include technologies which isolate materials from migration pathways or receptors such that exposure pathways are not complete. Specific to the Taracorp site, these actions address soils having lead concentrations in excess of acceptable concentrations and the waste piles.

#### 2.2.4 Removal Actions

Removal Actions include technologies which prevent complete exposure scenarios by removing the contaminant source. These actions include methods which address soils with unacceptable lead concentrations and the waste piles.

#### 2.2.5 Treatment Actions

Treatment Actions address contaminants by reducing their toxicity, mobility or volume such that acceptable risks are attained.

### 2.3 Identification and Screening of Technologies

#### 2.3.1 No Action

##### Description

No Action as a General Response Action does not include any remedial technologies. As will be presented in Section 3, this No Action Alternative will include institutional controls such as fencing, land use restrictions, deed restrictions, and ground water monitoring. The No Action Alternative would thus limit

exposure to contaminants and provide continuing information on environmental conditions. It would not, however, achieve all remedial action objectives.

#### Screening

The initial screening of the No Action General Response Action for contaminated soils/alleys and the waste piles are presented in Tables 9-12. Although no action does not achieve the remedial action objectives, it will be considered further in accordance with the NCP.

### 2.3.2 Institutional Actions

#### Descriptions

Institutional Actions include action restrictions for the contaminated soil and fill areas and access restrictions and monitoring for the waste piles. The technologies and process options for this General Response Action are presented in Tables 9 and 10 for the contaminated soil/alley areas and waste piles respectively. As noted in Tables 9 and 10, process options of fencing, land use restrictions, and deed restrictions were identified for the soil/alley areas and waste piles. Ground water monitoring was also identified for the waste piles.

Fencing would include the placement of a fence around the contaminated areas to limit access and thereby reduce risks of direct contact with the contaminated areas. Land use restrictions and deed restrictions would also reduce risks of direct contact

with the contaminants by restricting land use. Ground water monitoring would provide information relative to the migration of contaminants off-site.

#### Screening

The initial screening of technologies and process options for Institutional Actions is presented in Tables 9 and 10. The process options which were identified were found to be potentially applicable. Following the initial screening, the process options were evaluated using the criteria of effectiveness, implementability, and cost. The process option evaluation is presented in Tables 11 and 12 for the soil/alley and waste piles, respectively. Although the process options would not be effective in reducing contamination, the access restrictions would serve to limit access and direct contact exposure, and ground water monitoring would provide information relative to contaminant migration. The identified process options will be considered further.

#### 2.3.3 Containment Actions

##### Description

Contaminant Actions include capping and land disposal technologies. The remedial technologies and process options for this General Response Action are presented in Tables 8 and 9 for the contaminated soil/alley areas and waste piles, respectively. The capping process options include clay, asphalt, and concrete for

both the contaminated soil/alley areas and waste piles. In addition, a multimedia cap is considered for the waste piles. A landfill process option is also considered for both areas.

Capping with clay would involve the installation of compacted clay with a vegetated soil layer over the contaminated areas. Similarly, the use of asphalt, sod, or concrete would involve the installation of a layer of the material over the areas of contamination. A multimedia cap would be comprised of soil bedding, a synthetic membrane, lateral drainage materials, and vegetated soil. These materials would be placed over the areas of contamination. Landfilling would include the placement of contaminated soil and other non-hazardous materials in a non-RCRA landfill; hazardous materials would be placed in a RCRA landfill.

The initial screening of technologies and process options for Containment Actions is presented in Tables 9 and 10. All identified process options, with the exception of capping with sod over the waste piles, were determined to be potentially applicable.

The evaluation of process options using the criteria of effectiveness, implementability, and cost is summarized in Tables 11 and 12 for the contaminated soil/alleys and waste piles, respectively. Relative to the contaminated soil/alleys, two types of areas would need to be addressed in vegetated soil areas (e.g., lawns) and alleys. For the vegetated soil areas, sod is the process option selected to represent the capping technologies, whereas asphalt is representative of the capping technologies for the alleys. These process options will be considered further.

Landfilling will also be considered further. The multimedia cap will be carried forward as representative of capping technologies for the waste piles. In addition, landfilling of waste pile materials will be considered further.

#### 2.3.4 Removal Actions

##### Description

Removal Actions include the excavation remedial technology which can be utilized to remove materials from their existing locations so they can be managed more appropriately. Excavation process options are presented in Tables 9 and 10 for the contaminated soil/alleys and waste piles, respectively. The identified excavation process options include backhoes, cranes, front-end loaders, scrappers, pumps, industrial vacuum, drum grapplers, and forklifts. The initial screening of technologies and process options is summarized in Table 9 for the contaminated soil/alleys and Table 10 for the waste piles.

Backhoes and front-end loaders were determined to be potentially applicable for excavating the contaminated soil/alley areas. Backhoes, cranes, front-end loaders, and drum grapplers were identified as potentially applicable for excavating the materials found in the waste piles.

The evaluation of process options using the criteria of effectiveness, implementability, and cost is presented in Tables 11 and 12 for the contaminated soil/alley areas and waste piles,

respectively. Each of the process options which passed the initial screening also passed the evaluation of process options and will be considered further.

#### 2.3.5 Treatment Actions

##### Description

Treatment Actions include solidification/stabilization/fixation, recycle/recovery, thermal treatment, and chemical/physical treatment technologies. These types of technologies are used to reduce or minimize the mobility, toxicity, or volume of contaminants. As shown in Table 9, solidification/stabilization/fixation, chemical/physical treatment, recycle/recovery and thermal treatment technologies were identified for the contaminated soil/alley areas. The process options for solidification/stabilization/fixation include proprietary processes such as those marketed by Chemfix, Lopat Enterprises, and EnviroSAFE. Soil washing/leaching and in-place precipitation immobilization are process options in the chemical/physical treatment technology. Thermal treatment process options for the contaminated soil/alley include incineration and in-situ vitrification. Hard rubber which was used as fill and paving materials could be recycled/recovered as an additive in the manufacture of asphalt.

The remedial technologies and process options identified for the waste piles are presented in Table 10. The remedial technologies include recycle/recovery, solidification/stabilization/fixation, and thermal treatment. The recycle/recovery process options include segregation methods such as those developed

by M.A. Industries, Polycycle, Inc. and Cal West, as well as heavy media separation. Electrowinning, extraction, and asphalt addition are other recycle/recovery process options which could be used to recycle or recover the waste pile materials. The solidification/stabilization/fixation process options which were identified for the contaminated soil/alley areas could also be applied to the waste piles. The thermal treatment process options for the waste piles include in-situ vitrification and secondary lead smelters such as Master Metals.

Solidification/stabilization/fixation processes are used to physically or chemically bind contaminants such that their mobility is reduced or prevented. The processes are most effective when the contaminated materials and stabilizing agents are mixed in a reactor rather than in-situ. Proprietary processes such as those marked by Chemfix, Lopat Enterprises, and EnviroSAFE are representative of those available. The stabilization process would render waste materials non-EP Toxic such that they would be managed as non-hazardous waste. This process option could be used to treat contaminated materials from both the soil/alley areas and the waste piles.

The two process options identified for the chemical/physical treatment of contaminated materials were soil washing/leaching and in-situ precipitation immobilization. The soil washing/leaching process option involves the washing of contaminants from the soil using an aqueous solution of acid, base, chelating agent, oxidizing agent, or surfactant. The process would be conducted in a reaction

vessel or vessels. The washed soil could be replaced as backfill or landfilled as appropriate. The leachate would be treated. In-situ precipitation immobilization would involve treatment of the soil with a solution which would immobilize the metallic contaminants in the soil column through precipitation. This process would be conducted in-situ.

Several recycle/recovery options were identified, primarily for the waste pile constituents. Separation methods for the waste pile include proprietary processes marketed by M.A. Industries, Polycycle Industries, Cal West, and heavy media separation. M.A. Industries' two systems are for battery reclamation and classification. These separate battery materials (hard rubber, plastics, oxides) using a hydro-classification system. The Polycycle Industries and Cal West systems also use hydroclassification to separate materials and are fundamentally similar to the M.A. Industries system. Heavy media separation processes separate solids of different specific gravity, utilizing a fine-grained solid of high specific gravity suspended in a liquid. Upon introduction into the suspension liquid, solids with a sufficiently high specific gravity sink, whereas solids with low specific gravity float.

Electrowinning is a method by which metals are electrolytically extracted from their soluble salts. In this process, contaminated materials are initially leached, followed by a liquid/solid separation, and then the metals are electrowon in an electrolytic cell.

The hard rubber from the alleys and waste piles could potentially also be used as an additive in the manufacture of asphalt. This would be similar to solidifying the hard rubber materials in that it would result in reduced mobility of contaminant associated with the hard rubber.

The thermal treatment process options were also identified and screened. These processes included in-situ vitrification, secondary lead smelting, and incineration. In-situ vitrification is a process where an electric current is passed through soil or waste materials between electrodes. The resistance to the electric current generates enough heat to oxidize organic constituents and melt soil. The metallic constituents are sealed in the resulting glass-like matrix. Off-gases are collected and treated.

A secondary lead smelter could be used to recover lead remaining in some of the waste pile constituents. This would have to be preceded by a separation technology such that the lead-bearing materials could be separated from the non-smelttable materials. Master Metals, Inc. currently operates a secondary lead smelter.

Incineration is a process whereby organic constituents are oxidized or pyrolyzed. In some cases, inorganic constituents have reportedly been fixed in the ash such that non-EP toxic conditions are established. In other cases, this has not been the case.

#### Screening

Tables 9 and 10 summarize the initial screening of Treatment Action technologies and process options for the soil/alley areas

and waste piles, respectively. For the soil/alley areas, solidification/stabilization/fixation, using a proprietary process, and chemical/physical treatment using soil washing/leaching were determined to be potentially applicable for either the soil or alley fill and paving materials. Using the alley fill and paving material (hard rubber) as an asphalt addition was also determined to be potentially applicable. Relative to the waste piles, segregation using M.A. Industries/Polycycle Industries/Cal West, secondary smelting, and using the hard rubber as an asphalt additive were determined to be potentially applicable.

These potentially applicable options were then evaluated using the criteria of effectiveness, implementability and cost. The results are summarized in Tables 11 and 12 for the contaminated soil/alley areas and waste piles, respectively. The process options of segregation (M.A. Industries, Polycycle Industries, or cal West), secondary lead smelting and asphalt addition will be considered further.

#### 2.4 Summary of Remedial Technology Screening

The remedial technologies and process options which passed the screening process are presented in Tables 11 and 12. These technologies and process options will be used to develop remedial alternatives, as presented in Section 3.



## SECTION 3 DEVELOPMENT OF THE PRELIMINARY ALTERNATIVES

### 3.1 Development of Preliminary Remedial Alternatives

The screening of the remedial technologies summarized in Section 2 eliminated those which were not protective of the public health or the environment or were not technically or economically feasible. This process resulted in the selection of several process options as identified in Tables 11 and 12. In this section the selected process options will be combined into a series of preliminary remedial alternatives which address each of the media targeted for remediation.

The Preliminary Remedial Alternatives illustrated in Table 13 are described in this section. The descriptions include the following:

- o Key features of the alternative;
- o Conceptual design features of major facilities, operating equipment and construction machinery;
- o Engineering, safety, institutional, environmental and public health considerations that may influence the effectiveness of the alternative;
- o Maps depicting the extent of the remedial activity; and
- o Operation, maintenance and monitoring requirements.

Common to many of the remedial alternatives are institutional controls. The controls available under federal and state law are summarized below.

**Site Access Restrictions** - A fence is an effective method for preventing unintentional contact with contaminated soils and discouraging intentional contact.

**Restrictive Covenants** - Restrictive covenants can be imposed on the use of the property. A property owner may proscribe property use above and below the ground surface. Restrictions against use of the surface part of the property could include, prohibitions against any construction which would disturb a surface cap. Restrictions against subsurface use could include prohibitions against excavations into subsurface contamination or installation of borings for any purpose, including ground water withdrawal wells. Institutional controls on property not owned by Taracorp could be implemented either through private agreements or through the EPA's authority to exercise eminent domain.

**Covenant Not to Sell Property** - Taracorp has the right to covenant not to sell the property. Execution of an instrument legally binding on Taracorp as well as on its successors and assigns.

**Conveyance of Rights to a Third Party** - Taracorp could convey portions of the property to another party such as the State of Illinois. Such a conveyance would ensure that institutional controls be maintained in perpetuity.

#### 3.1.1 Alternative A

**Monitoring:** Air Quality Monitoring; Ground Water Monitoring

**Institutional Controls:** Site Access Restrictions; Land Use Restrictions; Deed Restrictions; Sale Restrictions

The no action alternative (A) includes a group of activities that can be used to monitor contaminant transport. The pathways considered potentially viable include air, surface soils, and ground water. These activities are designed to prevent unacceptable contact by the public with the contaminants present in the Taracorp and SLLR piles. It includes institutional controls on the Tarcorp property and other properties where residual concentrations do not meet Remedial Objectives.

High volume air monitors are presently located in Granite City as illustrated in Figure 8. A review of IEPA air monitoring data in Granite City will be done on an annual basis. →

Ground water monitoring will be performed twice per year at each of the existing wells illustrated on Figure 7. In addition, an additional well would be installed adjacent to well 104 which will be screened at a lower elevation. This new well will be used to better define ground water quality in the deeper water table aquifer. The analytical program will include pH, conductivity, alkalinity, sulfate, total dissolved solids, arsenic, cadmium, and lead.

An annual report will be prepared which summarized the results of sampling conducted during the previous calendar year. The report will present the data obtained as well as an interpretation of that data.

The institutional controls pertinent to this alternative include site access restrictions, restrictive covenants, deed restrictions, property transfer restrictions, and private third-party agreements.

### 3.1.2 Alternative B

Monitoring: Air Monitoring, Ground Water Monitoring

Taracorp Pile: Multimedia Cap, Institutional Controls

Taracorp Drums: Off Site Recovery at Secondary Lead Smelter

Area 1 Unpaved Areas: Asphalt Cap

Area 1 SLLR Piles: Consolidate in Taracorp Pile

Area 2 Unpaved Public Areas: Sod or Asphalt Cover

Venice Alleys: Asphalt Cap

Eagle Park: Vegetated Clay Cap, Institutional Controls

The air and ground water monitoring included in the no action alternative would be implemented with the necessary reporting requirements.

Under this alternative wastes contained within the SLLR piles would be consolidated into the Taracorp pile and capped with a multimedia membrane cap. Figure 9 presents a typical section of the proposed cap as well as potential finished grades for the closed landfill. Institutional controls would be included which include site access restrictions, restrictive covenants, deed restrictions, and property transfer restrictions.

Drums containing lead drosses and other production byproducts would be removed to an off site secondary lead smelter for recovery of the lead.

Portions of Area 1 which are currently not paved would be covered with an asphalt cover.

Portions of Area 2 which are unpaved and subject to public recreational activities will be covered with either sod or asphalt. The selection of a cover will be determined by present usage. Unpaved driveways and alleys will have asphalt applied while grassed or open areas will have sod applied. Removal of existing soils is limited to driveway subgrade preparation, therefore, surface elevations will change somewhat depending on surface treatment. Any soil removed will be transported to the Taracorp pile for use in grading before cap installation.

The Venice alleys would be covered in accordance with present usage. ➞

Eagle Park would be purchased and a vegetated clay cap capable of meeting 35 IAC Subtitle G requirements would be installed over the case material. Institutional controls including site access restrictions, restrictive covenants, deed restrictions, and property transfer restrictions would be implemented.

### 3.1.3 Alternative C

Monitoring: Air Monitoring, Ground Water Monitoring

Taracorp Pile: Multimedia Cap, Institutional Controls

Taracorp Pile Drums: Off-Site Recovery at Secondary Lead Smelter

Area 1 Unpaved Areas: Asphalt Cap

Area 1 SLLR Piles: Consolidate in Taracorp Pile

Area 2 Unpaved Public Areas: Excavate and Restore

Areas 3,4,5 Unpaved Public Areas: Sod or Asphalt Cover

Venice Alleys: Excavate Case Material and Transfer to Taracorp Pile and Restore Surfaces

Eagle Park: Excavate Case Material and Transfer to Taracorp Pile and Restore Surfaces

The air and ground water monitoring included in the no action alternative would be implemented with the necessary reporting requirements.

Under this alternative wastes contained within the SLLR piles, Venice alleys, and Eagle Park Acres would be consolidated into the Taracorp pile and capped with a multimedia membrane cap. Figure 9 presents a typical section of the proposed cap as well as a

potential finished grades for the closed landfill. Institutional controls would be included which include site access restrictions, restrictive covenants, deed restrictions, property transfer restrictions.

Drums containing lead drosses and other production by products would be removed to an off site secondary lead smelter for recovery of the lead.

Portions of Area 1 which are unpaved would be paved with asphalt.

Portions of Area 2 which are unpaved and subject to public recreational activities will be excavated to a depth of three inches and resurfaced in accordance with present land use. Driveways and alleys will have asphalt applied while grassed or open areas will have sod applied.

Portions of Areas 3, 4, and 5 which are unpaved and subject to public recreational activities will be covered with either sod or asphalt. The selection of a cover will be determined by present usage. Removal of existing soils would be limited to subgrade preparation for asphalt driveways therefore, surface elevations will change slightly depending on surface treatment. Any soils removed would be transported to the Taracorp pile to help meet target grades before cap installation.

The Venice alleys would be excavated to remove battery case material to the Taracorp pile for containment. The surfaces would be restored in accordance with current usage.

The portion of Eagle Park Acres which contains battery case material would be excavated and transported to the Taracorp pile for containment. The land would be regraded and covered with sod.

#### 3.1.4 Alternative D

Monitoring: Air Monitoring, Ground Water Monitoring

Taracorp Pile: Partial Recycle, Multimedia Cap, Institutional Controls

Taracorp Pile Drums: Off Site Recovery at Secondary Lead Smelter

Area 1 Unpaved Areas: Asphalt Cap -

Area 1 SLLR Piles: Consolidate in Taracorp Pile ➤

Area 2 Unpaved Public Areas: Excavate and Restore

Areas 3, 4, and 5 Unpaved Public Areas: Sod or Asphalt Cover

Venice Alleys: Excavate and Restore Surfaces ➤

Eagle Park: Excavate and Restore Surfaces

The air and ground water monitoring included in the no action alternative would be implemented with the necessary reporting requirements.

Under this alternative wastes contained within the SLLR piles and the Taracorp pile would be processed using technology similar to that used by SLLR to recover lead oxide dusts and segregate hard rubber from plastic battery case material. The slag, matte and other debris in the Taracorp Pile would remain within the pile. Soils from Venice alleys, Eagle Park, and Area 2 would be consolidated into the Taracorp pile and capped with a multimedia membrane cap. Figure 9 presents a typical section of the proposed cap. The finished grade for the closed landfill will differ from

that in Figure 9 due to the 40% reduction in volume expected from the recycling operation. Institutional controls would be included which include site access restrictions, restrictive covenants, deed restrictions, and property transfer restrictions.

Drums containing lead drosses and other production by products would be removed to an off site secondary lead smelter for recovery of the lead.

Portions of Area 1 which are unpaved would be excavated to a depth of three inches and then paved with asphalt. Excavated material will be transported to the Taracorp Pile for disposal.

Portions of Area 2 which are unpaved and subject to public recreational activities will be excavated to a depth of three inches and resurfaced in accordance with present land use. Driveways and alleys will have asphalt applied while grassed or open areas will have sod applied. Excavated material will be transported to the Taracorp Pile for disposal.

Portions of Areas 3, 4 and 5 which are unpaved and subject to public recreational activities will be covered with either sod or asphalt. The selection of a cover will be determined by present usage. Removal of existing soils would be limited to subgrade preparation for asphalt driveways, therefore, surface elevations will change slightly depending on surface treatment. Any soils removed would be transported to the Taracorp pile to help meet final grades prior to cap installation.

7

The Venice alleys would be excavated to remove battery case material to the Taracorp pile for containment. The surfaces would be restored depending on current usage.

The portion of Eagle Park Acres which contains battery case material would be excavated and transported to the Taracorp pile for containment. The land would be regraded and covered with sod.

### 3.1.5 Alternative E

Monitoring: Ground Water Monitoring

Taracorp Pile: Excavation Off Site for Recycle and RCRA Landfill

Taracorp Drums: Off Site recovery at Secondary Lead Smelter

Area 1 Unpaved Areas: Excavate and Transport to RCRA Landfill, Restore

Area 1 SLLR Piles: Excavate and Transport with Taracorp Pile for Off Site Recycle and RCRA Landfill

Area 2 Unpaved Public Areas: Excavate and Transport to Non-RCRA Landfill, Restore

Areas 3, 4 and 5 Unpaved Public Areas: Sod or Asphalt Cover

Venice Alleys: Excavation and Transport to RCRA Landfill, Restore

Eagle Park: Excavation and Transport to RCRA Landfill, Restore  
The ground water monitoring included in the no action alternative would be implemented with the necessary reporting requirements.

Wastes contained within the SLLR piles and the Taracorp pile would be excavated and transported to an off-site location where separation of recoverable materials could be implemented. The residue from recovery operations which is expected to include slag

will be transported to a RCRA Landfill for disposal. The area now occupied by the pile would be surfaced in accordance with Taracorp's plans for this area.

Drums containing lead drosses and other production by products would be removed to an off site secondary lead smelter for recovery of the lead.

Portions of Area 1 which are unpaved would be excavated to a depth of three inches and then paved with asphalt. The excavated soil would be transported to a RCRA landfill for containment.

Portions of Area 2 which are unpaved and subject to public recreational activities will be excavated to a depth of three inches and resurfaced in accordance with present land use. Driveways and alleys will have asphalt applied while grassed or open areas will have sod applied.

Portions of Areas 3, 4 and 5 which are unpaved and subject to public recreational activities will be covered with either sod or asphalt. The selection of a cover will be determined by present usage. Removal of existing soils would be limited to subgrade preparation for asphalt driveways, therefore, surface elevations will change slightly depending on surface treatment. Any soils removed would be transported to a non-RCRA landfill for disposal.

The Venice alleys would be excavated to remove battery case material to an RCRA landfill for containment. The surfaces would be restored depending on current usage.

The portion of Eagle Park Acres which contains battery case materials would be excavated and transported to a RCRA landfill for containment. The land would be regraded and covered with sod.

### 3.2 Screening of Alternatives

This section will be prepared and submitted to the USEPA and IEPA as required by the Administrative Order by Consent.

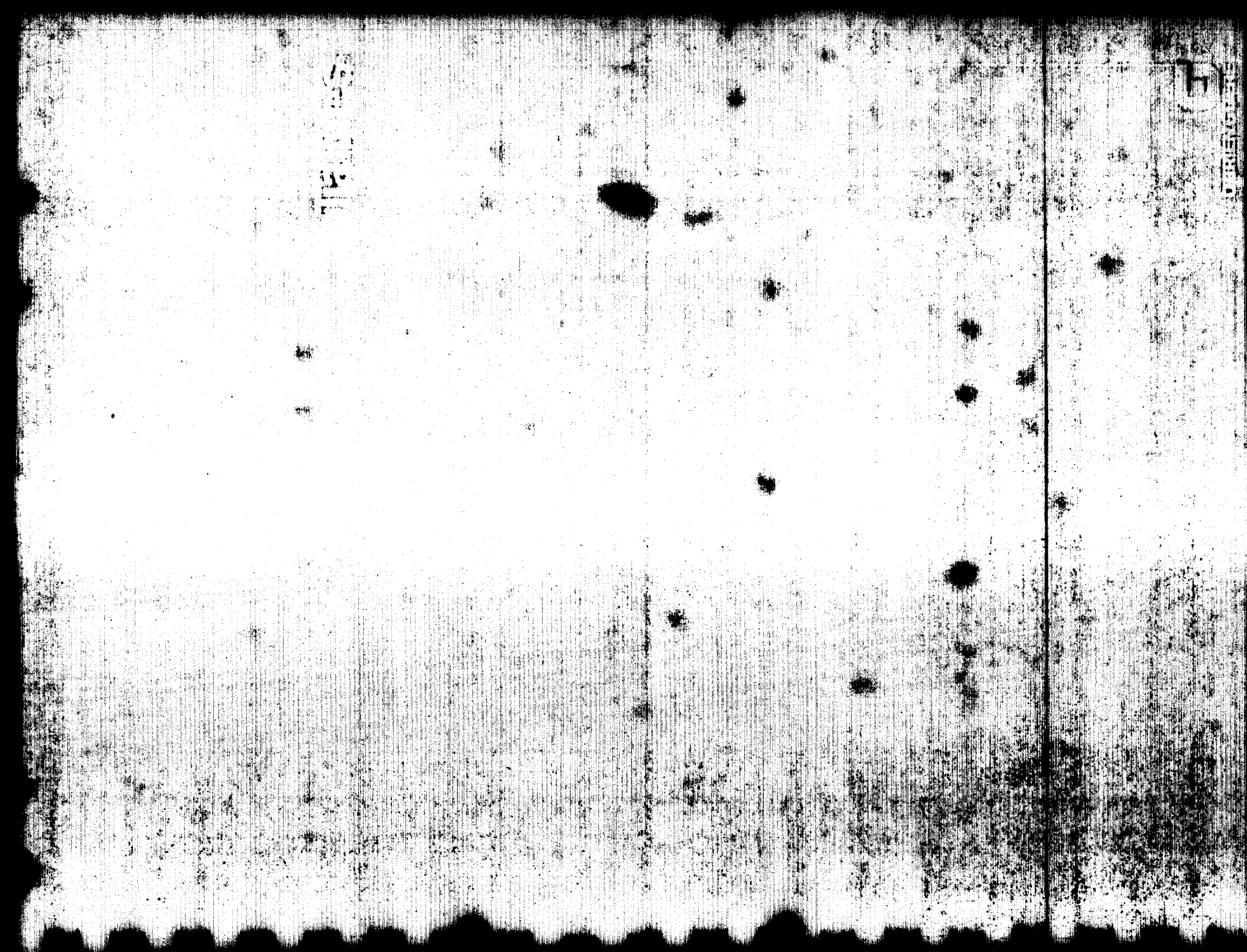


TABLE 5

ML INDUSTRIES  
GRANITE CITY  
GROUND WATER DATA SUMMARY

SHALLOW WELLS (2)

parameter	101	102	103	104	105	106	107	108
	avg.	max.	avg.	max.	avg.	max.	avg.	max.
Sulfate	168	190	210	125	320	290	280	300
Total Dissolved Solids	615	630	640	380	1000	1100	835	850
Lead (1)	.004*	.009	.012	LT.005	LT.005	LT.005	LT.005	LT.005
Barium (1)	LT.1	LT.1	LT.1	LT.1	LT.1	LT.1	LT.1	LT.1
Cadmium (1)	.002*	.007	LT.001	.001*	.002	.013	.001*	.001
Selenium (1)	LT.0035	LT.005	LT.005	.003*	LT.005	LT.005	LT.0035	LT.005
Arsenic (1)	.079	.101	LT.005	LT.005	LT.005	LT.005	LT.005	LT.005
Copper (1)	LT.01	LT.01	LT.01	LT.01	LT.01	LT.01	LT.01	LT.01
Iron (1)	21	22	.12	LT.1	LT.1	LT.1	LT.1	LT.1
Nickel (1)	LT.01	LT.01	LT.01	LT.01	LT.01	LT.01	LT.01	LT.01
Manganese (1)	4.7	5.5	.27	.028	LT.025	.06	.105	.139
Silver (1)	LT.005	LT.005	LT.005	LT.005	LT.005	LT.005	LT.005	LT.005
Zinc (1)	.039*	.10	LT.035	LT.035	LT.02	.27	LT.035	LT.05
Chromium (1)	LT.005	LT.005	LT.005	LT.005	LT.005	LT.005	LT.005	LT.005
Antimony (1)	LT.02	LT.02	LT.02	LT.02	LT.02	LT.02	LT.02	LT.02
Mercury (1)	LT.0005	LT.0005	LT.0005	LT.0005	LT.0005	LT.0005	LT.0005	LT.0005

(1) Filterable Values

(2) All data reported in units of mg/l

\* Average values calculated using one-half of detection limit for less than detectable values.

TABLE 2  
ML INDUSTRIES  
GRANITE CITY  
GROUND WATER DATA SUMMARY

DEEP WELLS (2)

parameter	105		106		107		108		109		110	
	avg.	max.	avg.	max.	avg.	max.	avg.	max.	avg.	max.	avg.	max.
Sulfate	160	180	210	260	507	550	1759	1825	74	78	288	294
Total Dissolved Solids	640	660	685	770	1290	1370	4315	4600	520	530	993	1000
Lead <sup>(1)</sup>	LT.005	LT.005	.012	.013	LT.005	LT.005	.007*	.009	LT.005	LT.005	LT.005	LT.005
Barium <sup>(1)</sup>	LT 1	LT 1	LT 1	LT 1	LT 1	LT 1	LT 1	LT 1	LT 1	LT 1	LT 1	LT 1
Cadmium <sup>(1)</sup>	.003*	.006	.005	.008	LT.001	LT.001	3.85*	6.9	LT.001	LT.001	.002*	.004
Selenium <sup>(1)</sup>	LT.035	LT.085	.0028*	.003	LT.0035	LT.005	LT.0035	LT.005	LT.002	LT.002	LT.002	LT.002
Arsenic <sup>(1)</sup>	-	LT.005	.0037*	.005	.0068*	.014	.006*	.007	.0037*	.006	LT.005	LT.005
Copper <sup>(1)</sup>	LT.01	LT.01	.0125*	.02	LT.01	LT.01	LT.01	LT.01	LT.01	LT.01	LT.01	LT.01
Iron <sup>(1)</sup>	-	LT .1	LT .1	LT .1	6.7	8.1	LT .1	LT .1	.17*	.4	LT .1	LT .1
Nickel <sup>(1)</sup>	LT.01	LT.01	LT.01	LT.01	LT.01	LT.01	.74	.94	LT.01	LT.01	.013	.02
Manganese <sup>(1)</sup>	.237	.284	.184	.359	.40	.43	25.4	29.4	.163	.28	.99	1.0
Silver <sup>(1)</sup>	LT.005	LT.005	LT.005	LT.005	LT.005	LT.005	LT.005	LT.005	LT.005	LT.005	LT.002	LT.005
Zinc <sup>(1)</sup>	.0275*	.03	.067	.09	LT.02	LT.05	42.3	44	LT.02	LT.02	.013*	.02
Chromium <sup>(1)</sup>	LT.005	LT.005	LT.005	LT.005	LT.005	LT.005	LT.005	LT.005	LT.005	LT.005	LT.005	LT.005
Antimony <sup>(1)</sup>	LT.02	LT.02	LT.02	LT.02	LT.02	LT.02	LT.02	LT.02	LT.02	LT.02	LT.02	LT.02
Mercury <sup>(1)</sup>	LT.0005	LT.0005	LT.0005	LT.0005	LT.0005	LT.0005	LT.0005	LT.0005	LT.0002	LT.0002	LT.0002	LT.0002

(1) Filterable Values

(2) All data reported in units of mg/l

\* Average values calculated using one-half of detection limit for less than detectable values.

TABLE 2

AMBIENT AIR LEAD MONITORING DATA - QUARTERLY AVERAGES ( $\mu\text{g}/\text{m}^3$ )<sup>(1)</sup>

Year/Quarter	IEPA Air Monitor Location				2001 & 20th
	15th & Madison	19th & Adams	Roosevelt & Rock Road	1735 Cleveland	
1978 - 2	3.1	0.6	0.7	--	--
3	1.7	4.4	1.3	--	--
4	4.4	4.0	1.3	--	--
1979 - 1	2.6	1.0	1.3	--	--
2	3.2	0.9	1.2	--	--
3	2.0	1.1	1.3	--	--
4	3.0	2.6	1.2	--	--
1980 - 1	3.0	0.5	0.6	--	--
2	1.2	0.6	0.5	--	--
3	1.0	0.5	0.7	--	--
4	1.9	0.6	1.4	--	--
1981 - 1	2.1	0.5	0.5	--	--
2	1.0	1.6	0.9	--	--
3	1.8	0.5	1.1	--	--
4	7.3	0.5	0.9	--	--
1982 - 1	1.9	0.8	1.1	--	--
2	1.6	0.9	1.5	--	--
3	1.1	0.5	0.6	--	--
4	0.9	0.6	1.8	1.5	--
1983 - 1	1.1	0.5	0.4	1.0	--
2	0.4	0.3	0.3	0.7	--
3	0.68	0.37	0.36	0.76	--
4	0.76	0.51	0.67	0.62	--
1984 - 1	1.48	0.31	0.37	0.74	--
2	0.76	0.29	0.30	0.74	--
3	0.34	0.23	0.23	0.40	--
4	0.39	0.26	0.30	0.45	--
1985 - 1	0.59	0.13	0.14	0.25	0.23
2	0.42	0.26	0.20	0.44	0.28
3	0.23	0.17	0.21	0.33	0.20
4	0.27	0.18	0.17	0.28	0.20
1986 - 1	0.44	0.15	(2)	0.42	0.23
2	0.24	0.13	(2)	0.28	0.15
3	0.24	0.15	(2)	0.38	0.15
4	0.32	0.20	(2)	0.24	0.23

Notes:

- (1) Data from Illinois Environmental Protection Agency
- (2) Monitor discontinued

**TABLE 4**

**APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS \***

**CHEMICAL SPECIFIC ARARs**

1. PCBRR's; Title 35: EP; Subtitle B; AP; Chapter 1: PCB; 35 IAC Part 243: Air Quality Standards; Subpart B: Standards and Measurement Methods; Section 243.126: (Ambient Air Quality Standards =  $1.5 \mu\text{g}/\text{m}^3$ )
2. Occupational Safety and Health Administration (OSHA) 29 CFR 1910 (Permissible Exposure Limits for Lead =  $50 \mu\text{g}/\text{m}^3$ )
3. PCBRR's; Title 35: EP; Subtitle C; WP; Chapter 1: PCB; 35 IAC Part 302.208: Water Quality Standards; Subpart B: General Use Water Quality Standards (See Table 5).
4. PCBRR's; Title 35: EP; Subtitle G; WD; Chapter 1: PCB; 35 IAC Part 721.124: Identification and Listing of Hazardous Waste (Extraction Potential Toxicity Lead 5.0 mg/l)

**ACTION SPECIFIC ARARs**

1. Pollution Control Board Rules and Regulations (PCBRR's); Title 35: Environmental Protection (EP); Subtitle B; Air Pollution (AP); Chapter 1: Pollution Control Board (PCB); 35 Ill. Adm. Code (IAC) Part 201; Permits and General Provisions; Subpart C; Prohibitions; Section 201.141: Prohibition of Air Pollution.
2. PCBRR's; Title 35: EP; Subtitle B; AP; Chapter 1: PCB; 35 IAC Part 201: Permits and General Provisions; Subpart D: Permit Applications and Review Process; Section 201.152: Construction Permit Application.
3. PCBRR's; Title 35: EP; Subtitle B; AP; Chapter 1: PCB; 35 IAC Part 201: Permits and General Provisions; Subpart D: Permit Applications and Review Process; Section 201.157: Operating Permit Application
4. PCBRR's; Title 35: EP; Subtitle B; AP; Chapter 1: PCB; 35 IAC Part 203: Major Stationary Sources Construction and Modification.
5. PCBRR's; Title 35: EP; Subtitle B; AP; Chapter 1: PCB; 35 IAC Part 212: Visual and Particulate Matter Emissions; Subpart K: Fugitive Particulate Matter.
6. PCBRR's; Title 35: EP; Subtitle B; AP; Chapter 1: PCB; 35 IAC Part 212: Visual and Particulate Matter Emissions; Subpart L: Particulate Matter Emissions from Process Emission Sources; Section 212.321: New Process Sources.
7. PCBRR's; Title 35: EP; Subtitle B; AP; Chapter 1: PCB; 35 IAC Part 243: Air Quality Standards; Subpart B: Standards and Measurement Methods; Section 243.126: Lead.
8. PCBRR's; Title 35: EP; Subtitle C: Water Pollution (WP); Chapter 1: PCB; 35 IAC Part 302: Water Quality Standards; Subpart B: General Use Water Quality Standards and Subpart C: Public and Food Processing Water Supply Standards.
9. PCBRR's; Title 35: EP; Subtitle C: (WP); Chapter 1: PCB; 35 IAC Part 304: Effluent Standards; Subpart A: General Effluent Standards.

**TABLE 4**  
(continued)

**ACTION SPECIFIC ARARs**

10. PCBRR's; Title 35: EP; Subtitle C: WP; Chapter 1: PCB; 35 IAC Part 307: Sewer Discharge Criteria; Subpart B: General and Specific Pretreatment Requirements.
11. PCBRR's; Title 35: EP; Subtitle C: WP; Chapter 1: PCB; 35 IAC Part 310: Pretreatment Programs; Subpart B: Pretreatment Standards and Subpart D.
12. PCBRR's; Title 35: EP; Subtitle C: WP; Chapter 1: PCB; 35 IAC Part 312: Treatment Plant Operator Certification.
13. PCBRR's; Title 35: EP; Subtitle C: WP; Chapter 2: PCB; 35 IAC Part 370: Recommended Standards for Sewer Works.
14. PCBRR's; Title 35: EP; Subtitle G: Waste Disposal (WD); Chapter 1: PCB and Chapter II: Environmental Protection Agency (EPA); 35 IAC.
15. PCBRR's; Title 35: Chapter 1: 35 IAC Part 721: ID and Listing of Hazardous Waste.
16. PCBRR's; Title 35: Chapter 1: 35 IAC Part 722: Hazardous Waste Generator Standards; Subparts A-E.
17. PCBRR's; Title 35: Chapter 1: 35 IAC Part 723: Hazardous Waste Transporter Standards.
18. PCBRR's; Title 35: Chapter 1: 35 IAC Part 725: Interim Status Standards For Hazardous Waste TSD Facility Owners and Operators. Section 725.410 Closure and Post Closure.
19. PCBRR's; Title 35: EP; Subtitle C: WD; Chapter 1: PCB and Chapter II: EPA; 35 IAC Part 809: Special Waste Hauling, Subparts B-G.
20. Ill. Revised Statutes, Chapter 111 1/2, Paragraph 1039(h).
21. PCBRR's; Title 35: EP; Subtitle H: Noise; Chapter 1: PCB; 35 IAC Part 901: Sound Emission Stds. and Limitations.

**LOCATION SPECIFIC ARARs**

None.

- \* Based on the alternatives developed, the following potential Applicable or Relevant and Appropriate Requirements (ARARs) supplied by Illinois Environmental Protection Agency are not considered ARARs at the Taracorp Site.
11. PCBRR's; Title 35: EP, Subtitle C: WP; Chapter 1: PCB; 35 IAC Part 309 Permits; Subpart A: NPDES Permits.
  12. PCBRR's; Title 35: EP; Subtitle C: WP; Chapter 1: PCB; 35 IAC Part 309; Subpart A: NPDES Permits; Section 309.143 Effluent Limitations.
  16. Ill. Revised Statues; Shapter 19; Paragraph 65(f): Floodplains Construction Permits.
  17. PCBRR's; Titel 35: EP; Subtitle G: Waste Disposal (WDP; Chapter 1: PCB and Chapter II Environmental Protection Agency (EPA); 35 IAC Part 700, Part 703, Part 705, part 724, and Part 726.

**TABLE 4**  
**(continued)**

18. **PCBRR's; Title 35: EP; Subtitle G: WD; Chapter I: PCB and Chapter II: EPA; 35 IAC Part 729: Landfills: Prohibited Haz. Wastes; Subpart C: Liquid Hazardous Waste.**
19. **PCBRR's; Title 35: EP; Subtitle G: WD; Chapter I: PCB and Chapter II: EPA; 35 IAC Part 807: Solid Waste, Subparts C, E, and F.**
20. **PCBRR's; Title 35: EP; Subtitle C: WD; Chapter I: PCB and Chapter II: EPA; 35 IAC Part 807: Solid Waste; Subpart B.**

**TABLE 5**  
**GROUND WATER QUALITY STANDARDS**

<u>Paramter</u>	<u>Concentration<sup>(1)</sup>(mg/l)</u>
Arsenic	1.0
Barium	5.0
Boron	1.0
Cadmium	0.05
Chloride	500
Chromium VI	0.05
Chromium CR III	1.0
Copper	0.02
Cyanide	0.025
Fluoride	1.4
Iron	1.0
Lead	0.1
Manganese	1.0
Mercury	0.0005
Nickel	1.0
Phenols	0.1
Selenium	1.0
Silver	0.005
Sulfate	500
TDS	1000
Zinc	1.0

(1) 35 Illinois Administrative Code Part 302.208. General Use Standards

**TABLE 6**

**PRELIMINARY REMEDIAL ACTION OBJECTIVES  
TECHNOLOGY TYPES AND PROCESS OPTIONS**

<b>Environmental Media</b>	<b>Remedial Action Objectives</b>	<b>General Response Actions</b>	<b>Remedial Technology Type</b>	<b>Process Options</b>
<b>Soil</b>	<b>Prevent ingestion/direct contact with soil having lead in excess of acceptable risk concentrations in residential yards, schools, and parks</b>	<b>No action Institutional Actions</b>	<b>No Action Institutional Options</b> Fencing Deed Restriction	
		<b>Containment Actions</b>	<b>Containment Technologies</b> Capping Dust Controls	<b>Sod/Soil/Asphalt Dust Control Agents</b>
	<b>Prevent inhalation of lead concentrations above 1.5 ug/m<sup>3</sup></b>	<b>Removal Actions</b>	<b>Removal Technologies</b> Excavation	<b>Solids Excavation</b>
		<b>Treatment Actions</b>	<b>Treatment Technologies</b> Fixation	<b>Lopat Enterprises</b> <b>Envirosafe</b> <b>Chemfix</b>
	<b>Prevent migration of lead to the groundwater which would result in a concentration higher than 0.1 mg/l in accordance with 35 IAC Part 302 B</b>			

**TABLE 6**  
(continued)

<b>Environmental Media</b>	<b>Remedial Action Objectives</b>	<b>General Response Actions</b>	<b>Remedial Technology Type</b>	<b>Process Options</b>
<b>Solid Waste</b>	<b>Achieve on acceptable level of risk from direct contact with the waste pile contents</b>	<b>No Action Institutional Actions</b>	<b>No Action Institutional Options</b> Fencing Deed Restrictions	
		<b>Containment Actions</b>	<b>Containment Technologies</b> Capping Vertical barriers Horizontal barriers	<b>Membrane, Asphalt, Concrete, Vegetative Slurry wall, sheet piling Grout Injection</b>
	<b>Prevent inhalation of lead at concentrations above 1.5 ug/m<sup>3</sup></b>			
	<b>Prevent migration of metals to the ground water which would result in concentrations higher than 35 IAC Part 302 B standards</b>	<b>Removal Technologies</b>	<b>Excavation</b> <b>Drum Removal</b>	<b>Solids excavation</b> <b>Drum Removal</b>
		<b>Treatment Actions</b>	<b>Treatment Technologies</b> Physical treatment Chemical treatment	<b>Crushing, grinding</b> <b>Lopat, Chemfix</b>
		<b>Recycle Actions</b>	<b>Recycle Technologies</b>	<b>Electrowinning</b> <b>Master Metals</b> <b>ASARCO</b> <b>Extraction</b> <b>Smelting</b>

TABLE 7

## ESTIMATED SURFACE AREAS, VOLUMES AND MASSES

	Surface Area (SF)	Volume (CY)	Mass (Tons)
Taracorp Pile			
Slag/Matte	NA	47,000	200,000
Case Material	NA	34,000	30,000
Lead Dust	NA	4,000	30,000
Contained Drosses, etc.	NA	8	12
Area 1 Unpaved Area			
Case Material	NA	400	5,400
Surface Soil	340,000 (1)	3,100 (2)	5,000 (3)
Area 2 Unpaved			
Driveways	110,000 (1)	1,000 (2)	1,600 (3)
Open/Lawns	350,000 (1)	3,200 (2)	5,200 (3)
Area 3, 4, 5 Unpaved			
Driveways	370,000 (1)	3,400 (2)	5,500 (3)
Open/Lawns	730,000 (1)	6,800 (2)	11,000 (3)
Venice Alleys	72,000	670	1,100
Eagle Park Acres	20,000	2,700	4,400

(1) Based on May 1988 aerial photographs at 1"=100' scale.

(2) Assumes 3" deep excavation.

(3) Assume 120 lbs./cubic foot of soil.

TABLE 8  
GENERAL RESPONSE ACTIONS <sup>(1)</sup>

General Response Action

No Action  
Containment  
Pumping  
Collection  
Diversion  
Complete Removal  
Partial Removal  
On-Site Treatment  
Off-Site Treatment  
In-Situ Treatment  
Storage  
On-Site Disposal  
Off-Site Disposal  
Alternative Water Supply  
Relocation

<sup>(1)</sup> From: U.S. EPA, 1985. Guidance on Feasibility Studies Under CERCLA. Prepared for Hazardous Waste Engineering Research Laboratory, Cincinnati, Ohio, and Office of Emergency and Remedial Response and Office of Waste Programs Enforcement, Washington, D.C.

TABLE 9

Initial Screening of Technologies and  
Process Options for Soils/Alleys

## General Response:

<u>Action-Soil/Alleys</u>	<u>Remedial Tech.</u>	<u>Process Option</u>	<u>Description</u>	<u>Screening Comments</u>
No Action	None	Not Applicable	No Action	Req'd for consideration by NCP
Institutional Action	Access Restrictions	Fencing	Fence around properties	Potentially applicable
	Access Restrictions	Land Use Restrictions	Restricts land use	Potentially applicable
	Access Restrictions	Deed Restrictions	Restricts land use	Potentially applicable
Containment Action	Capping	Clay	Compacted clay with soil over areas of contamination	Potentially applicable
	Capping	Asphalt	Layer of asphalt over areas of contamination	Potentially applicable
	Capping	Sod	Layer of sod over areas of contamination	Potentially applicable
	Capping	Concrete	Concrete slab over areas of contamination	Potentially applicable

**General Response:**

<b><u>Action-Soil/Alleys</u></b>	<b><u>Remedial Tech.</u></b>	<b><u>Process Option</u></b>	<b><u>Description</u></b>	<b><u>Screening Comments</u></b>
<b>Removal Action</b>	<b>Land Disposal</b>	<b>Landfill</b>	<b>Placement of contaminated soils in non-RCRA landfill</b>	<b>Potentially applicable</b>
	<b>Excavation</b>	<b>Backhoe</b>	<b>Excavation using backhoe</b>	<b>Potentially applicable</b>
	<b>Excavation</b>	<b>Crane</b>	<b>Excavation using crane</b>	<b>Not feasible due to need for fine control of excavator</b>
	<b>Excavation</b>	<b>Front-end Loader</b>	<b>Excavation using front end loader</b>	<b>Potentially applicable</b>
	<b>Excavation</b>	<b>Scrapers</b>	<b>Excavation using scrapers</b>	<b>Not feasible due to need for fine control of excavator</b>
	<b>Excavation</b>	<b>Pumps</b>	<b>Excavation using pumps</b>	<b>Not effective to excavate soils/fill</b>
	<b>Excavation</b>	<b>Industrial Vacuums</b>	<b>Excavation using industrial vacuums</b>	<b>Not effective to excavate soils/fill</b>
	<b>Excavation</b>	<b>Drum Grapplers</b>	<b>Excavation using drum grapplers</b>	<b>Not effective to excavate soils/fill</b>
	<b>Excavation</b>	<b>Forklifts</b>	<b>Excavation using forklifts</b>	<b>Not effective to excavate soils/fill</b>

**General Response:**

<b><u>Action-Soil/Alloys</u></b>	<b><u>Remedial Tech.</u></b>	<b><u>Process Option</u></b>	<b><u>Description</u></b>	<b><u>Screening Comments</u></b>
<b>Treatment Action</b>	<b>Solidification/ Stabilization/ Fixation</b>	<b>Chemfix/Lopat Enterprises/ Enviro-safe</b>	<b>Proprietary Fixation process</b>	<b>Potentially applicable</b>
	<b>Chemical/Physical</b>	<b>Soil Washing/Leaching</b>	<b>Extracts contaminants from solids</b>	<b>Potentially applicable</b>
	<b>Chemical/Physical Treatment</b>	<b>In-situ precipitation immobilization</b>	<b>Immobilizes inorganics in place</b>	<b>Not effective in addressing direct contact exposure</b>
	<b>Recycle/Recovery</b>	<b>Asphalt manufacturer</b>	<b>Hard rubber recycle of of asphalt</b>	<b>Potentially applicable for hard rubber used as fill and paving</b>

Recycle/Re: ry

Asphalt manufacturer

inorganics in  
place

not effective in  
addressing direct  
contact exposure

Hard rubber  
recycle of  
of asphalt

Potentially applicable  
for hard rubber used  
as fill and paving

Capping

Asphalt

Layer of  
asphalt over  
areas of  
contamination

Potentially applicable

Capping

Sod

Layer of sod  
over areas of  
contamination

Not in compliance with  
regulations for  
hazardous waste

**General Response:**

**Action-Waste Piles**

**Remedial Tech.**

**Process Option**

**Description**

**Screening Comments**

**Capping**

**Multimedia Cap**

Synthetic  
membrane with  
soil over areas  
of contamination

**Potentially applicable**

**Capping**

**Concrete**

Concrete slabs  
over areas of  
contamination

**Potentially applicable**

**Land Disposal**

**Landfill**

Placement of  
RCRA in land-  
fill or non-  
RCRA waste in  
a non-RCRA  
landfill

**Potentially applicable**

**Removal Action**

**Excavation**

**Backhoe**

Excavation  
using backhoe

**Potentially applicable**

**Excavation**

**Crane**

Excavation  
using crane

**Potentially applicable**

**Excavation**

**Front-end Loader**

Excavation  
using front  
end loader

**Potentially applicable**

**Excavation**

**Scrapers**

Excavation  
using scrapers

**Not effective in  
excavating fill**

**Excavation**

**Pumps**

Excavation  
using pumps

**Not effective in  
excavating fill**

**General Response:**

**Action-Waste Piles**

<b>Treatment Action</b>	<b><u>Remedial Tech.</u></b>	<b><u>Process Option</u></b>	<b><u>Description</u></b>	<b><u>Screening Comments</u></b>
	Excavation	Industrial Vacuum	Excavation using industrial vacuum	Not effective in excavating fill
	Excavation	Drum Grapplers	Excavation using drum grapplers	Potentially applicable for drum removal
	Excavation	Forklift	Excavation using forklifts	Not effective in excavating fill/drums
	Recycle/Recovery	Segregation M.A. Industries/ Polycycle/Cal-West	Segregation using hydro-classification	Potentially applicable
	Recycle/Recovery	Heavy media separation	Segregation using heavy separation	Not effective for smaller particles (<0.5 mm)
		Electrowinning	Electrolytic extraction of metals	Not feasible
	Chemical/Physical treatment	Leaching	Chemical extraction of metals	Not feasible
		Asphalt manufacturer	Hard rubber recycle with asphalt	Potentially applicable
	Solidification/ Stabilization/ Fixation	Chemfix/Lopat Enterprises/ Envirosafe	Proprietary fixation processes	Potentially applicable

**General Response:**

**Action-Waste Piles**

**Remedial Tech.**

**Process Option**

**Description**

**Screening Comments**

**Thermal treatment**

**In-Situ Vitrification**

**Vitrifies  
materials in  
place**

**Not feasible**

**Thermal treatment**

**Master Metals**

**2<sup>o</sup> lead smelter**

**Potentially applicable**

**TABLE 11**

**Evaluation of Process Options - Soils/Aleays**

**General Response:**

<b><u>Action-Soil/Aleays</u></b>	<b><u>Remedial Tech.</u></b>	<b><u>Process Option</u></b>	<b><u>Effectiveness</u></b>	<b><u>Implementability</u></b>	<b><u>Cost</u></b>
<b>No action</b>	<b>None</b>	<b>Not applicable*</b>	<b>Does not achieve remedial action, objectives</b>	<b>Not acceptable to agencies</b>	<b>None</b>
<b>Institutional Action</b>	<b>Access Restrictions</b>	<b>Fencing*</b>	<b>Useful in limiting access. Does not reduce contamination.</b>	<b>Conventional construction. Alone, not acceptable to agencies</b>	<b>Low capital, low O&amp;M</b>
	<b>Access Restrictions</b>	<b>Land Use* Restrictions</b>	<b>Useful in limiting exposures. Does not reduce contamination.</b>	<b>Land use changes may be difficult to implement.</b>	<b>Potentially moderate capital, low O&amp;M</b>
	<b>Access Restrictions</b>	<b>Deed Restrictions*</b>	<b>Effectiveness depends on continued future implementation. Does not reduce contamination.</b>	<b>Legal requirement</b>	<b>Low capital</b>
<b>Containment Action</b>	<b>Capping</b>	<b>Clay</b>	<b>Effective susceptible to cracking, requires O&amp;M</b>	<b>Easily implemented, restrictions on future land use.</b>	<b>Low capital, low O&amp;M</b>

**\* Selected representative technologies.**

**General Response:**

<u>Action-Soil/Air</u>	<u>Remedial Tech.</u>	<u>Process Option</u>	<u>Effectiveness</u>	<u>Implementability</u>	<u>Cost</u>
	Capping	Asphalt*	Effective susceptible to weathering, requires O&M	Easily implemented, restrictions on future land use.	Low capital, low O&M
	Capping	Sod*	Effective, requires O&M	Easily implemented, restrictions on future land use.	Low capital, low O&M
	Capping	Concrete	Effective, susceptible to weathering, cracking, requires O&M.	Easily implemented, restrictions on future land use.	Moderate capital, moderate O&
	Land Disposal	Landfill*	Effective	Easily implemented	Moderate capital
Removal Action	Excavation	Backhoe*	Effective and reliable	Easily implemented	Moderate capital
	Excavation	Front-end Loader*	Effective and reliable	Easily implemented	Moderate capital
Treatment Action	Solidification/ Stabilization/ Fixation	Chemfix, Lopat Enterprises Envirosafe	Effectiveness and reliability require pilot test to determine	Readily implemented	High capital

\* Selected representative technologies.

**General Response:**

**Action-Soil/Air/water**

**Remedial Tech.**

**Process Option**

**Effectiveness**

**Implementability**

**Cost**

**Chemical/Physical  
Treatment**

**Soil Washing/  
Leaching**

**Effectiveness  
and reliability  
require pilot  
test to  
determine.**

**Moderately  
difficult to  
implement.  
Requires  
construction  
of treatment  
equipment.**

**High  
capital,  
High O&M.**

**Recycle/Recover**

**Asphalt  
Manufacturer\***

**Effectiveness  
requires pilot  
test to  
determine**

**Easily  
implementable if  
manufacturer  
available for  
hard rubber only**

**Moderate  
capital**

**\* Selected representative technologies.**

**TABLE 12**

**Evaluation of Process Options - Waste Piles**

**General Response:**

<u>Action-Soil/Air/Leak</u>	<u>Remedial Tech.</u>	<u>Process Option</u>	<u>Effectiveness</u>	<u>Implementability</u>	<u>Cost</u>
No Action	None	Not applicable*	Does not achieve remedial action objectives.	Not acceptable to agencies	None
Institutional Action	Access Restrictions	Fencing*	Useful in limiting access. Does not reduce contamination.	Conventional construction. Alone, not acceptable to agencies	Low capital, low O&M
	Access Restrictions	Land Use Restrictions*	Useful in limiting exposures. Does not reduce contamination.	Readily implementable.	Low capital
	Access Restrictions	Deed Restrictions*	Effectiveness depends on continued future implementation. Does not reduce contamination.	Legal requirement	Low capital
	Monitoring	Ground Water* Monitoring	Useful for documented condition. Does not reduce risks by itself.	Alone, not acceptable to agencies	Low capital, Low O&M

\* Selected representative technologies.

**General Response:**

**Action-Soil/Alloys**

**Remedial Tech.**

**Process Option**

**Effectiveness**

**Implementability**

**Cost**

**Containment Action**

**Capping**

**Clay**

**Effective  
susceptible to  
cracking,  
requires O&M**

**Difficult  
implementation  
due to space  
restrictions.**

**Low capital,  
low O&M**

**Capping**

**Asphalt**

**Effective  
susceptible to  
weathering,  
requires O&M**

**Easily  
implemented,**

**Low capital,  
moderate O&**

**Capping**

**Multimedia cap\***

**Effective,  
requires O&M**

**Easily  
implemented,**

**Moderate  
capital,  
low O&M**

**Capping**

**Concrete**

**Effective,  
susceptible to  
weathering,  
cracking,  
requires O&M.**

**Easily  
implemented,**

**Moderate  
capital,  
moderate O&**

**Land Disposal**

**Landfill\***

**Effective and  
reliable**

**Easily  
implemented**

**High  
capital**

**Removal Action**

**Excavation**

**Backhoe\***

**Effective and  
reliable**

**Easily  
implemented**

**Low capital**

**Excavation**

**Crane\***

**Effective and  
reliable**

**Easily  
implemented**

**Low capital**

**Excavation**

**Front-end Loader\***

**Effective and  
reliable**

**Easily  
implemented**

**Low capital**

\* Selected representative technologies.

**General Response:**

**Action-Soil/Alloys**

**Remedial Tech.**

**Process Option**

**Effectiveness**

**Implementability**

**Cost**

**Excavation**

**Drum grapplers\***

**Effective and  
reliable for  
drum removal**

**Easily  
implemented**

**Low capital**

**Treatment Action**

**Recycle/Recovery**

**Segregation  
M.A. Industries/  
Polycycle/  
Cal West**

**Effective**

**Moderately  
difficult to  
implement.  
May require  
construction of  
equipment**

**High  
capital,  
Moderate O&**

**Recycle/Recovery**

**Asphalt  
manufacture**

**Effectiveness  
requires pilot  
test to  
determine**

**Easily  
implementable if  
manufacturer  
available for  
hard rubber only**

**Moderate  
capital**

**Thermal Treatment**

**Master Metals\***

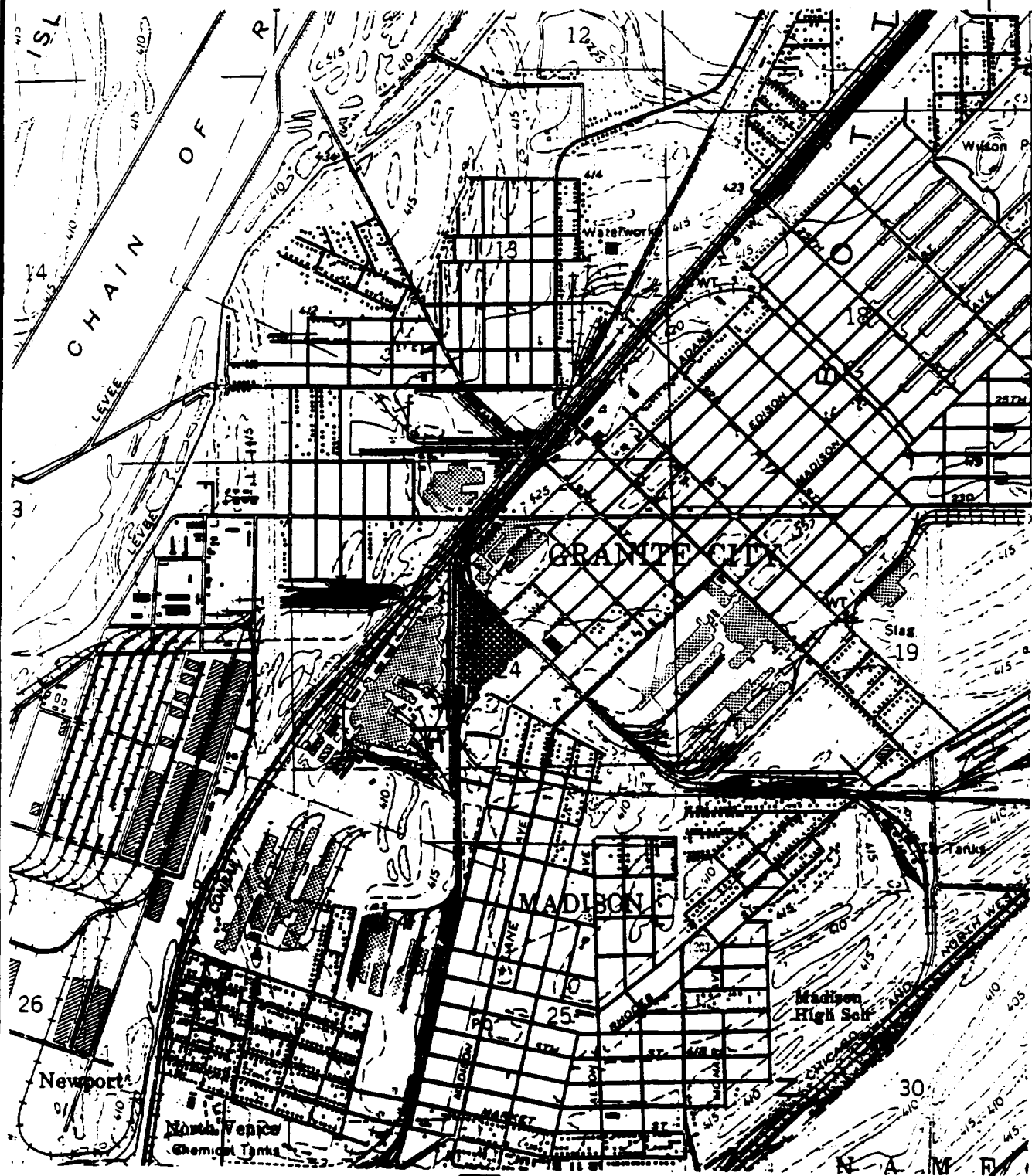
**Effectiveness  
requires pilot  
test to  
determine**

**Easily  
implementable for  
recoverable  
lead only**

**High  
capital**

NL INDUSTRIES  
GRANITE CITY SITE  
GRANITE CITY, ILLINOIS

LOCATION MAP



 - PROJECT SITE

NOTE: MAP ADAPTED FROM U.S.G.S.  
GRANITE CITY QUADRANGLE



SCALE



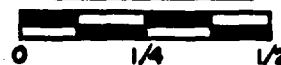
# NL INDUSTRIES GRANITE CITY SITE LAND USE MAP

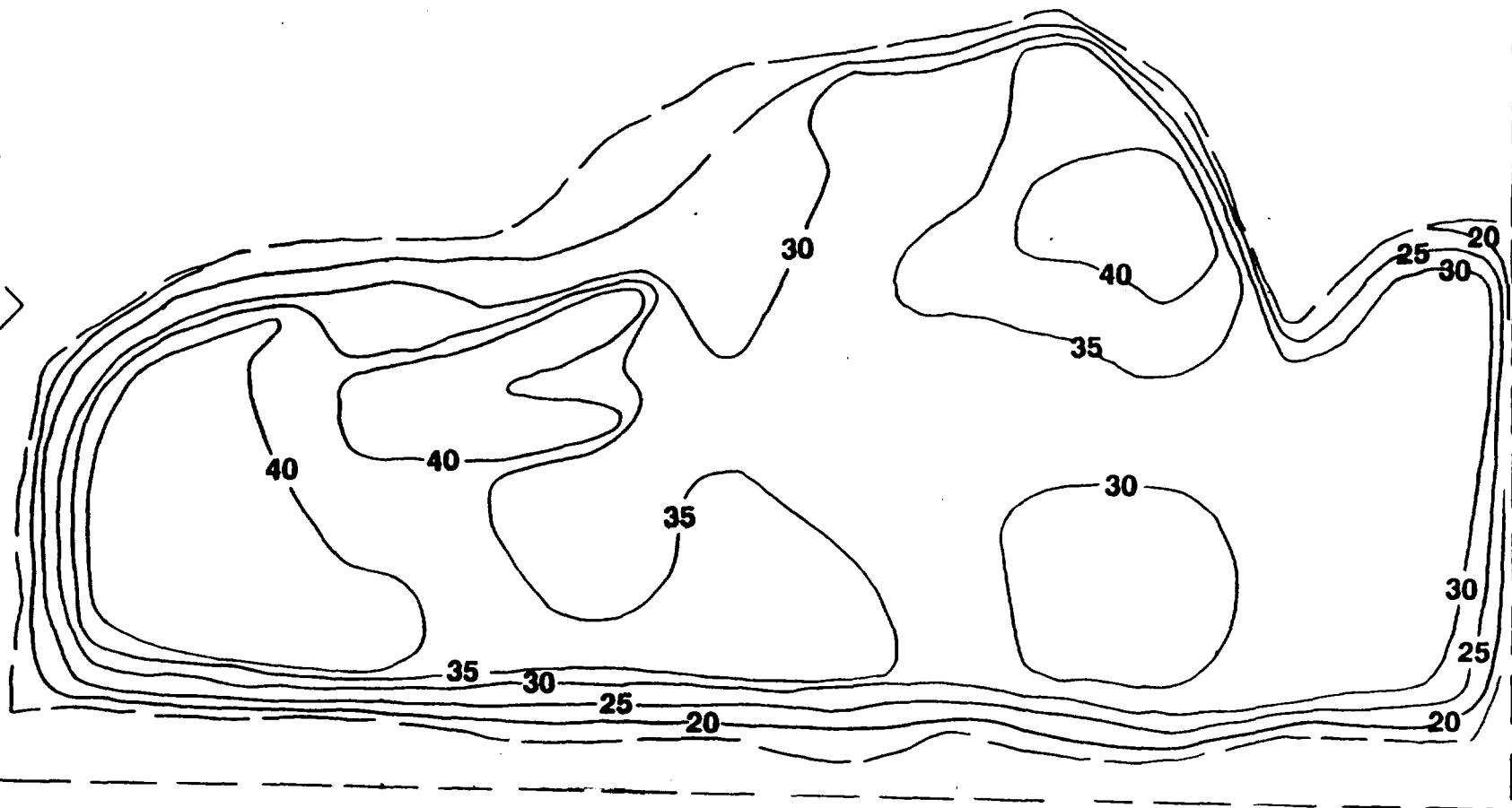


## LEGEND

R-1 SINGLE FAMILY RESIDENCE	C-1 OFFICE COMMERCIAL
R-2 SINGLE FAMILY RESIDENCE	C-2 NEIGHBORHOOD COMMERCIAL
R-3 SINGLE FAMILY RESIDENCE	C-3 COMMUNITY SERVICE
R-4 TWO FAMILY RESIDENCE	C-4 CENTRAL BUSINESS COMMERCIAL
R-5 MULTI-FAMILY RESIDENCE	C-5 HIGHWAY COMMERCIAL
R-6 MOBILE HOME RESIDENCE	C-6 PLANNED COMMERCIAL
M-1 WAREHOUSE INDUSTRIAL	M-3 HEAVY INDUSTRIAL
M-2 LIGHT INDUSTRIAL	M-4 PLANNED INDUSTRIAL

SCALE IN MILES

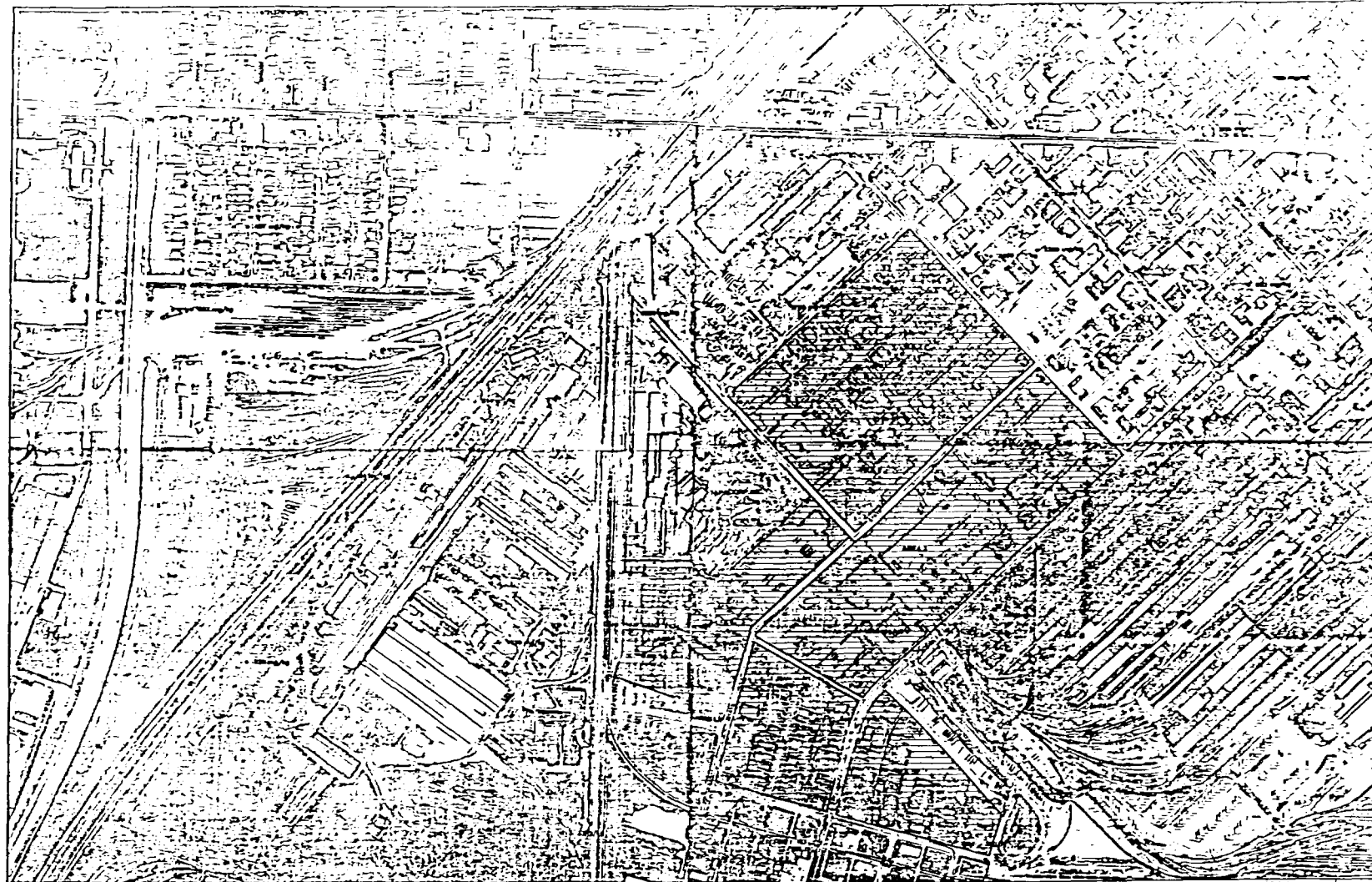




**CURRENT CONTOURS**

**GENERAL NOTES**

1. BENCH MARK - TOP RIM MANHOLE LOCATED AT THE INTERSECTION OF DELMAR AVE. & 16TH ST. (ELEV. 418.42).
2. ADD 400.0 TO SPOT ELEVATIONS SHOWN TO OBTAIN MEAN SEA LEVEL DATUM.
3. EXISTING GRADE SURROUNDING WASTE PILE VARIES FROM 416.0 TO 423.3 FEET.



AERIAL PHOTOGRAPHY PERFORMED  
IN MAY 1988

LANDING  
AT 720-408, SAMPLE LOCATION WITH  
CONCENTRATION EXPLORED  
IN 1987

NO.	DATE	BY

**G** O'BRIEN & GIERE  
ENGINEERING, P.C.  
Granite City, Illinois

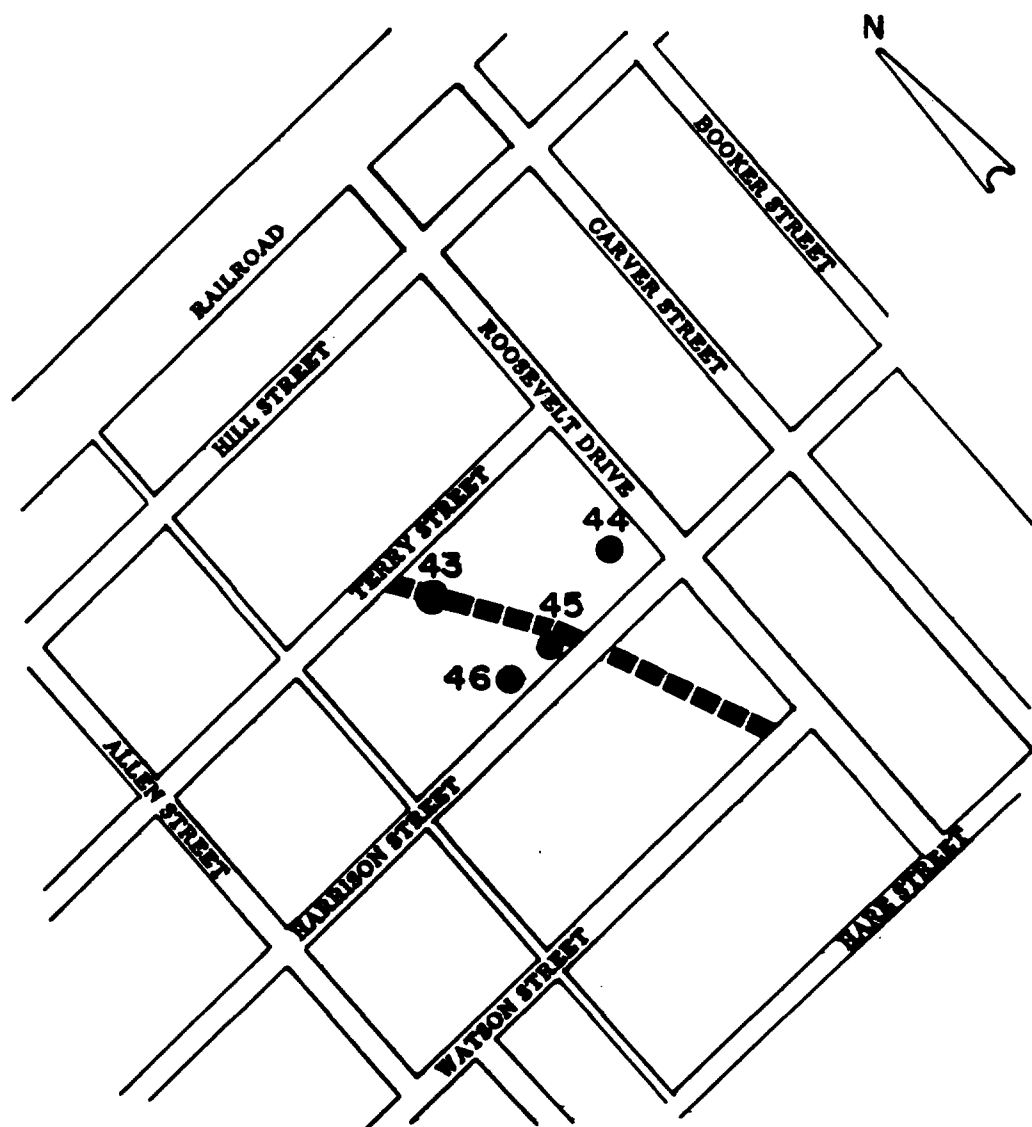
TARACORP SITE RI/FS  
GRANITE CITY, ILLINOIS

AERIAL PHOTOGRAPHS

1:25,000

DATE  
DRAWN  
CHECKED  
APPROVED

4



**REMOTE FILL AREA**

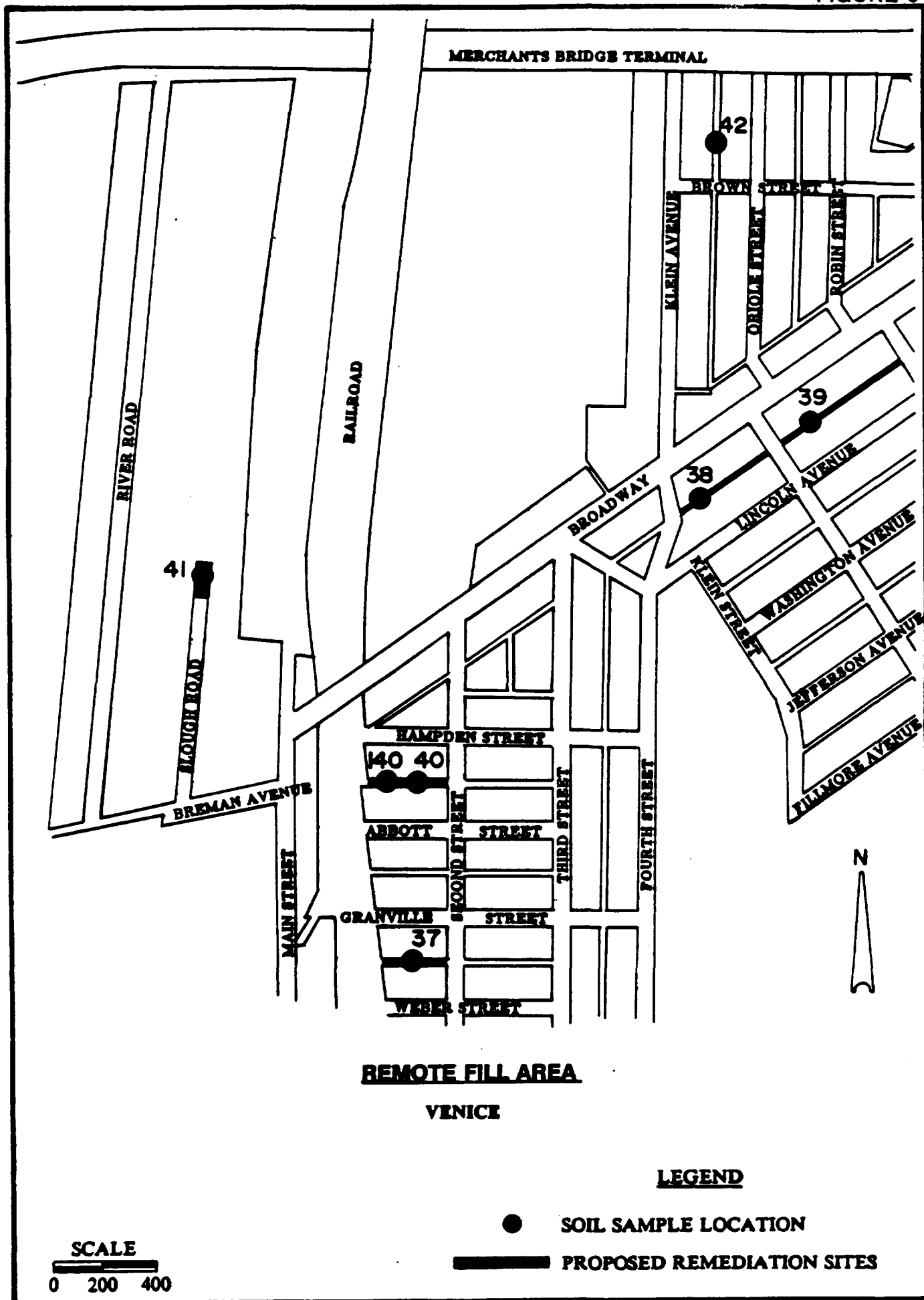
## EAGLE PARK ACRES

## LEGEND

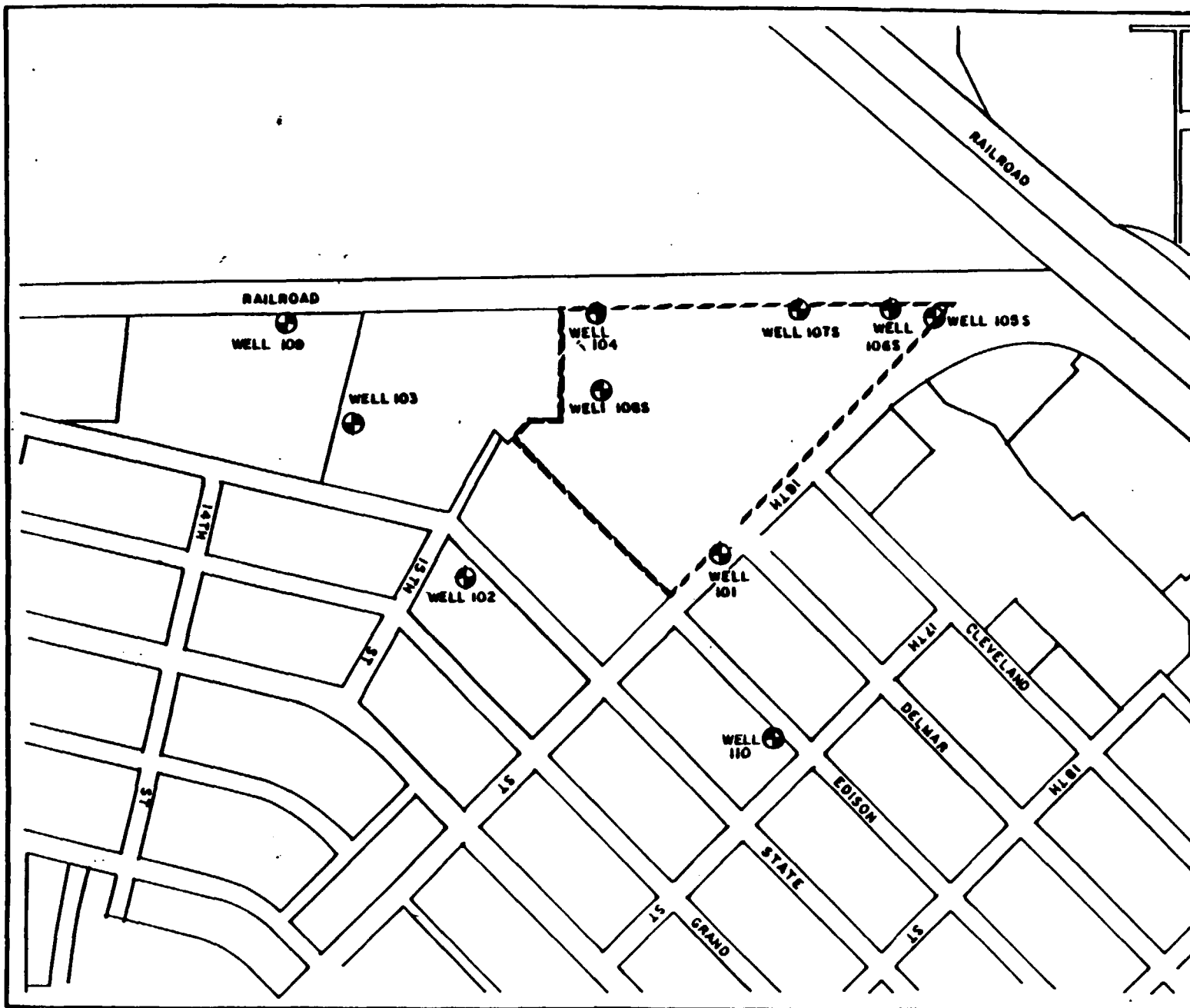
- SOIL SAMPLE LOCATION  
 ■■■■ APPROXIMATE LOCATION OF DITCH

## SCALE





063397



NL INDUSTRIES  
GRANITE CITY SITE  
GRANITE CITY, ILLINOIS

# WELL LOCATION MAP

## LEGEND

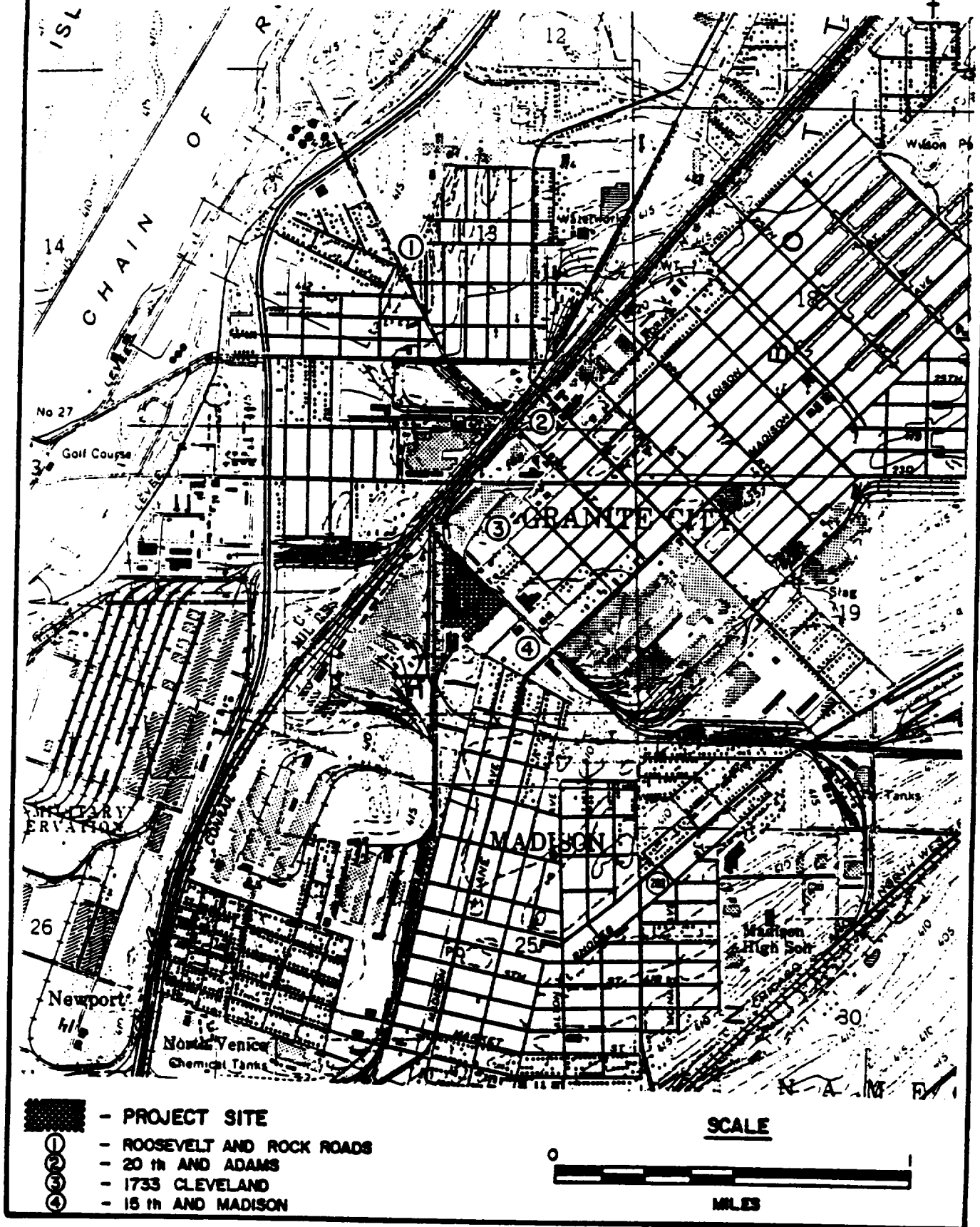
- WELL 101 GROUNDWATER MONITOR
- WELL & GROUNDWATER
- SITE PERIMETER

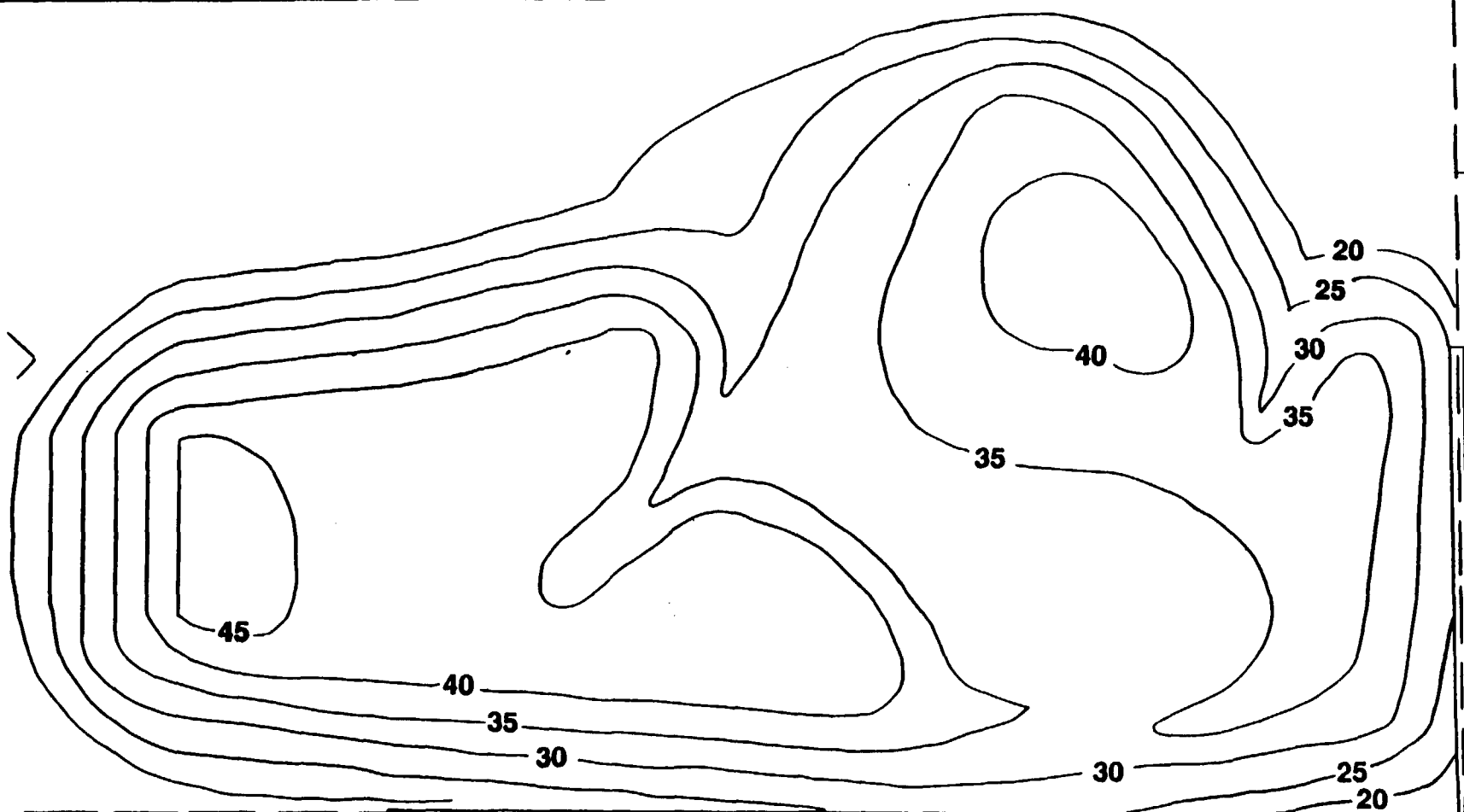
## SCALE



NL INDUSTRIES  
GRANITE CITY SITE  
GRANITE CITY, ILLINOIS

IEPA AMBIENT AIR MONITORING LOCATIONS

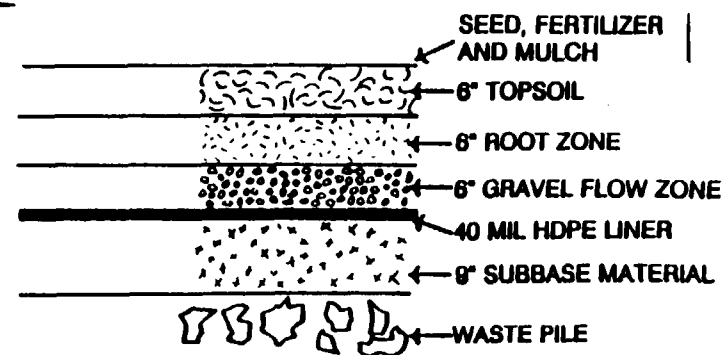




**PROPOSED CONTOURS**

**GENERAL NOTES**

1. BENCH MARK - TOP RIM MANHOLE LOCATED AT THE INTERSECTION OF DELMAR AVE. & 16TH ST. (ELEV. 418.42).
2. ADD 400.0 TO SPOT ELEVATIONS SHOWN TO OBTAIN MEAN SEA LEVEL DATUM.
3. EXISTING GRADE SURROUNDING WASTE PILE VARIES FROM 416.0 TO 423.3 FEET.



**LANDFILL CAP DETAIL**



**ORRIN & GERE**  
ENGINEERS, INC.



TALACORP SITE, GRANITE CITY  
REMEDIATION ALTERNATIVE MATRIX

GENERAL RESPONSE ACTION									
MEDIUM	TECHNOLOGY	PROCESS	NO ACTION	A	B	C	D	E	
TALACORP COPD FILE SOIL	PREVENT EXPOSURE FENCE AND DEAD RESTRICTIONS	EXCAVATE HEAVY EQUIPMENT AND TRUCK	DISPOSAL OFF-SITE RCMA LANDFILL	ON-SITE SEPARATION	OFF-SITE PROCESSING	CONTAINMENT MEDIUM CAP	MONITOR GROUND WATER MONITORING ON DIV 1		
	TALACORP COPD FILE DUMPS	EXCAVATE HEAVY EQUIPMENT AND TRUCK	RECYCLE SECONDARY PS SMELTER						
VENICE PAVED ON- AND RESTORE ATTENTS	CONTAINMENT	OFF-SITE RCMA LANDFILL	ASPHALT CAP						
	DISPOSAL	ON-SITE WITH TALACORP PILE	OFF-SITE RCMA LANDFILL						
AREA 1 PAVED ON- EXPOSURE PREVENT EXCAVATE AND RESTORE	DISPOSAL	ON-SITE WITH TALACORP PILE	OFF-SITE RCMA LANDFILL	ASPHALTIC HYDRAULIC	HEAVY EQUIPMENT	EXCAVATE AND MOVE	OFF-SITE RCMA LANDFILL		
	MONITOR	GROUND WATER MONITORING ON DIV 1	RECYCLE NUMBER-PAVIT						
AREA 2 PAVED ON- EXCAVATION RESTORE	DISPOSAL	ON-SITE WITH TALACORP PILE	OFF-SITE RCMA LANDFILL						
	CONTAINMENT	BASED ON DRAIN	OFF-SITE RCMA LANDFILL						
AREA 3 PAVED ON- EXCAVATION RESTORE	DISPOSAL	ON-SITE WITH TALACORP PILE	OFF-SITE RCMA LANDFILL						
	CONTAINMENT	BASED ON DRAIN	OFF-SITE RCMA LANDFILL						
AREA 4 PAVED ON- EXCAVATION RESTORE	DISPOSAL	ON-SITE WITH TALACORP PILE	OFF-SITE RCMA LANDFILL						
	CONTAINMENT	BASED ON DRAIN	OFF-SITE RCMA LANDFILL						

